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Removal of Legal Restrictions on Hours of Labor.

The Supreme Court of the United States rendered a decision on Monday that is probably one of the most important it ever made. It declares unconstitutional the New York State law of 1900 making ten hours a working day and sixty hours a working week in bakeries. The action was brought against the State by a Utica non-union baker, who, four years ago, permitted a man to work extra hours in order to learn branches of his trade with which he was unfamiliar. The law forbade an employer to permit a man to work more than ten hours, the restriction having been imposed nominally in the interests of public health to prevent any improper conditions from surrounding the preparation of food. For violating this law the baker was arrested at the instance of the trade unions of the city and fined $50, and a little later another case was made against him. This he has fought ever since on the ground that the law was unconstitutional. In the New York Court of Appeals Chief Justice Parker wrote the prevailing opinion that the law was within the police power of the State for the protection of the public health. This ruling is overthrown in the decision of the United States Supreme Court, which says: "The general right to make a contract in relation to his business is part of the liberty of the individual, protected by the Fourteenth Amendment to the Federal Constitution. Under that provision no State can deprive any person of his life, liberty or property without due process of law. The right to purchase or sell labor is part of the liberty protected by this amendment, unless there are circumstances which exclude the right."

The far-reaching effect of this decision is self-evident. It means that no law is binding in this country which regulates the hours of labor in occupations that are not prejudicial to the health of the working people. This decision practically overthrows a considerable mass of legislation passed at the instigation of labor unions and makes the length of the working day a matter that must be settled between the men and the managers in every case. Just how the new conditions will affect the industrial world cannot be foreseen, but it is certain that it will no longer be considered necessary to pay blackmail to labor leaders in order to run shops in violation of labor laws as to hours of employment.

The Technical Publicity Association.

On April 27 the Technical Publicity Association will hold its first annual dinner in New York and elect officers to undertake the first year's work of the organization. It has been formed by the advertising representatives of a large number of companies engaged in making machinery and similar industries, but just what its objects and aims may be this journal does not know. The fact that the temporary secretary, Mr. George H. Gibson, manager of publicity of the International Steam Pump Co., has sent out an open notice of the meeting, indicates that the Association does not intend to be stealthy and secretive in its work. There is no reason why it should be, for such an organization is plainly required.

Technical publicity needs a lot of improvement, for the user and purchaser of tools, power plant and equipment of many kinds rarely gets more than a small part of the information he desires in either trade catalogues or advertising. This is necessarily the case. The catalogue feature of publicity is just now a hobby of many companies; whether it is being overdone or not only the future can show. The relations of such catalogues to the advertisements in technical journals have become considerably involved, but a discussion of them need not be attempted here. The relations between the advertising representatives and the editor are much more interesting, at least to the latter. If the Association can assist in putting them on a better plane, the subscribers to the technical papers will be benefited. This is important because in the final analysis the value of a publication is determined by the quality and number of its subscribers, and they are dependent on the reading matter.

The fact that people care enough about a paper to subscribe for it indicates that its reading pages give them information they desire. This information derives its value from the care with which it is edited and illustrated. Those responsible for the management should not care about the source of the information so long as the latter is what the subscribers wish. In these days one great source of technical information is industrial rather than professional in its character. A large part of the news that a technical paper must print in order to answer its subscribers' needs comes from manufacturing companies.

The trouble that sometimes arises between editor and advertiser is due to a failure by the latter to recognize the necessity of the news element in everything that appears in the reading pages of an influential journal. Trade "write-ups" have no place there, and the publication that prints them is not a property, but is merely an ephemeral journal. There are a number of publications that live up to the highest plane of journalistic morality. Reputable publicity managers soon learn that the size of their advertising appropriations for such journals makes no difference in the editorial consideration they receive. They also learn that these papers alone are worth advertising in. They finally appreciate that the improvement of the quality of their advertisements is the only active control they possess of any of the printed matter in such a publication.

The publicity managers can, however, be of material aid to the editors of reputable journals by keeping them in touch with the real news of their companies. It is a common editorial experience to be refused accurate information by one man connected with a company and to be criticised by another for failure to print just such information. If the editor feels that the publicity manager will assist him so far as the company's interests permit, the publicity manager's position will be strengthened in turn by the editor. The latter will greatly prefer to conduct his correspondence with one man, and to do his visiting to the works under the wing of one man, than to fritter away his time with the heads of many departments. There are a few corporations in which the entire management of all kinds of publicity is centered in one man, and these are the companies which are apparently most successful in this branch of their work.

The New Croton Dam.

Although the new Croton dam is still uncompleted, it has reached a point in the progress of its construction where it plays a most important part at a critical juncture in the water supply of the city of New York. The importance of the structure in its present unfinished condition lies in the fact that it is now impounding water behind it to a depth of nearly 125 ft. at the dam. With this depth the lake created by the dam is not far from twelve miles long, thus adding about 7,000 million gallons to the actual storage in the Croton watershed, or nearly twenty-five days' draft at the present rate. With the elevation of water surface thus formed the old Croton dam is entirely submerged with a number of feet of water above it; it has disappeared from view to be seen hereafter on exceedingly rare occasions, if ever. Inasmuch as it is now beyond question that the city of New York is in a critical condition under an impending shortage of its public water supply, this additional storage in the new Croton lake is of vital importance to the city's interests.

The accumulation of this water has demonstrated at least one condition which is of much significance in connection with proposed additional supply. It has commonly been estimated that a year might be needed to fill the new Croton lake. At the present time the unfinished masonry in the spillway of the new Croton dam is less than 30 ft. below its finished elevation, and yet the impounded volume of water has been accumulated within a period of less than three months since the closure of the openings in the dam through which the river has discharged its flow during construction. Furthermore, the water has accumulated so rapidly that it has been necessary to open the waste gates and allow the surplus in the lake to escape during several days at a rate of nearly one billion gallons per twenty-four hours. There is every reason to believe that had the dam been completed last December the lake would have been filled full, besides wasting a large volume during the spring floods.

The significance of this condition lies in the fact that it is a conclusive justification of the creation of further large volumes of storage in the Croton watershed. It is known that the Aqueduct Commission is about to advertise for contracts for the construction of a dam on Cross River about one mile east of Katonah to store about 9,000 million gallons of water; also that as soon as examinations and other initial work can be completed another large storage reservoir will be created by constructing a dam across Croton River near the village of Croton Falls with a capacity of 1,500 million gallons, or more, making an aggregate capacity of the two nearly equal to that of the new Croton lake.

This additional storage may be of almost immeasurable value to the city during the dry years now due and practically certain to occur before the proposed additional supply from the Catskills can be obtained. The experience gained in filling the new Croton lake during the past three months shows the entire feasibility of filling the proposed storage reservoirs on Cross River and at Croton Falls during ordinary seasons in less time even than it has commonly been supposed would be required to fill the new Croton lake. This additional storage cannot be created too soon for the safety of the city's interests.

There probably has never been a masonry dam for a great storage reservoir designed with more scientific accuracy than has been attained in the plans of the new Croton dam, the highest structure of its kind ever built; nor has the construction of a great masonry dam ever been carried to completion with more scrupulous care than in this case, both as to the preparation of the rock foundation bed and in the building of the dam itself. Its construction was begun in 1892 and it certainly should have been completed in a materially less time than has been required. The time originally estimated for construction was sensibly prolonged by the amount of rock found necessary to excavate in consequence of the soft and fissured character of the limestone first found in the excavation. All this defective material was removed so that the masonry of the dam rests upon hard and enduring rock. The change of plan from earth embankment to masonry for three hundred feet at the southerly end of the dam also added not less than one and one-half years to the period of construction. These measures, however, were found to be absolutely essential, and the people of the city of New York can at least felicitate themselves on possessing a structure of unusual excellence, including the southerly end of the dam, completed in masonry.

Although there is now a little less than 125 ft. head on the structure, the amount of seepage through it is extremely small. This imperviousness to water is highly satisfactory. It is probably impossible to construct any masonry that shall be absolutely water-tight. However much care may be exercised, a little water is bound to find its way through the pores or hair cracks of the masonry, but in this case careful examination shows that the amount of water so finding its way through the dam is unusually small.

It is only proper to give marked emphasis to these features of construction of the Croton dam in view of the grotesquely absurd reports that have been sown broadcast by the daily press and in some cases through channels ordinarily conservative. These reports have had no substantial basis whatever. It is quite natural that workmen should be employed upon the unfinished portions of the Croton dam until the masonry is completed. It is equally natural that the preservation of some earth banks about to be submerged at the old Croton dam or at other points should be effected by dumping riprap stone on their slopes. It is not clear, however, to the mind of the engineer at least, why such a method of preservation of earth banks several miles up stream from the new Croton dam itself should have any particular significance as to the stability of the latter, although a reporter of one of the great morning journals of New York City based an ingeniously erroneous statement of the dangerous condition of the new dam upon that simple operation. As usual in such cases, the "scare" statement was eagerly utilized by the press in various portions of the country. As a matter of fact, the filling of the Croton dam has not up to the present time disclosed a suspicion of weakness or instability at any part of the dam or any of its appurtenances. The test of accumulated storage has proved in every respect in the highest degree satisfactory. Indeed, it has been demonstrated that the city of New York has at least a monumental structure of solid enduring masonry behind which it may safely rely upon over three months' supply of water for the Boroughs of Manhattan and the Bronx, at the present rate of consumption, even though the reservoir should receive no inflow during that period.

The Bacteriolysis of Peptones and Nitrates.

In no branch of engineering has the work of American scientists been more distinctively useful than in sewage disposal. Until the Massachusetts State Board of Health began its investigations at the Lawrence experimental laboratory there was no really comprehensive theory of sewage disposal based on exact studies. Since the early work at Lawrence which demonstrated the reasons for the efficiency of intermittent filtration and the relative failure of some other methods of disposal, the research of chemists and bacteriologists of other countries has supplemented the experiments of engineers in producing some of the most interesting systems of disposal yet suggested. It is not probable that many of these will long possess more than historic value, yet they deserve attention as indications of the respect with which the designer of sewage treatment systems regards the teachings of science at the present time. As a general thing the engineer is inclined to look on the precision of the scientist as somewhat pedantic; the factor of safety with which the engineer tempers most of his designs is so great that he rarely has occasion to adopt the accuracy of the research laboratory. But in sewage disposal he has found the man of science to be his master. Without his aid he is never certain that his plans are best suited for given conditions or that his remedies for the unsatisfactory operating results of existing plants will be of much benefit.

Accordingly, the engineer takes a particular interest in work like that lately conducted at the Lawrence Experiment Station by Mr. Stephen DeM. Gage, under the direction of Mr. H. W. Clark, and described by him at the last general meeting of the American Chemical Society. It has long been recognized that there is no general method of sewage disposal, and that each problem must be solved independently. One reason for this is the great variation in the character of sewage, and another is the equally great variation in the bacterial flora active in different sewages. The biological sewage disposal systems depend for their successful control on a knowledge of the action of the various types of bacteria, and the research by Mr. Gage has been conducted to determine the functions of these organisms. The greatest difficulty in the investigation has been due to uncertainty as to the organisms. A slight change in the conditions surrounding a sample of sewage will cause a new species of bacteria to develop and possibly to alter completely the chemical reactions. Hence, it was necessary to work with pure cultures of the various species, for it seems likely that only in this way can data be obtained sufficiently exact for use in studying the more complex problems where mixed cultures of bacteria are active and the products of their activity react upon one another. The methods of carrying on this investigation are of more interest to biologists and chemists than to engineers, and as they are described very fully in the "American Chemical Journal's" reprint of Mr. Gage's paper, it is unnecessary to consider them here.

The results of the investigations made with several hundred cultures of the bacteria in sewage and the effluents from sewage disposal works are highly interesting. The purpose of the so-called biological systems of sewage disposal is to employ bacteria as the active agents in liquefying insoluble organic matter and in changing the soluble proteids, peptones, albumoses and other substances into ammonia. It has been found by the most careful research that the bacteria in sewage will accomplish all these desirable ends. They are able to produce ammonia from organic matter, to reduce nitrates to nitrites, ammonia and probably to elementary nitrogen; in fact, a list of the changes they can accomplish reads like the index to a treatise on chemistry. This information was pretty well established before Messrs. Clark and Gage began their work. The value of their research lies in the information it affords concerning the different action of the various species of bacteria. Some cultures have been able to reduce nitrates to nitrites, ammonia and elementary nitrogen continuously from the start, while with others this reduction proceeded in stages, and in still others one or another of the reduction products had not formed by the time the tests were finished. Just what practical result can be secured from this knowledge remains to be learned after the investigations have been extended to include the action of mixed cultures. It may be that studies of this class will ultimately show some method of regulating the action of biological disposal systems by some system of inoculation or seeding with bacteria having definite functions and cultivated for the purpose.

The Maintenance of Shop Equipment.

A paper was read before the Western Railway Club recently by Mr. M. K. Barnum which expresses the feelings of a great many shop superintendents responsible for turning out work of good quality at low cost. It referred specifically to the maintenance of railway repair shop machinery, but was applicable to many other industrial establishments. It was in substance a protest against setting a superintendent the impossible task of doing up-to-date work with antiquated equipment. Specific cases were cited to prove the wastefulness of good money which such a course entails. One company was mentioned which formerly had its shops filled with worn-out and obsolete tools. Although new locomotives were freely purchased it was impossible to keep them in condition, and engine failures were about three times the average on neighboring roads. Finally the shops were equipped with new tools, and by so doing the output of repairs was increased fifty per cent., with an increase of but ten per cent. in the payroll. A different case is that of a road with an old locomotive erecting and machine shop with only 21 pits, which nevertheless turns out in general repairs from 45 to 50 engines each month. In this shop, whenever any tool can be replaced by one that will earn ten per cent. or more on its cost, the old one is discarded. This practice has made it necessary to throw out old machinery estimated to be worth $25,000, in a few years, but the shop repairs satisfactorily twice as many locomotives per pit as the average shop. This practice is followed in other shops on the system, the Northwestern, and it is a noteworthy fact that the cost of maintenance of locomotives per year on this road is but $1,600, against an average of $2,300 on all the roads of the country.

Just why railway companies hang to their old machine tools so tenaciously is really surprising, because even "conservative" shops of other kinds recognize somewhat dimly the necessity of improvement. Mr. Barnum calls particular attention to two railways as examples of this tendency. One of them has 33 per cent. of its tools less than ten years old, 31 per cent. from ten to twenty years old, and the remaining 36 per cent. over twenty years. On the second road these figures are 24, 33 and 43 per cent., respectively. Anybody who knows the progress made in machine tool construction in the last ten years does not need to be told that these two roads are wasting a lot of money every year unnecessarily because their shops are not properly equipped.

In a general way Mr. Barnum advises setting aside annually five per cent. of the cost of machine tools as a renewal fund. This is not enough for tools of certain classes, while it is too much for others, but he believes that it will be a safe average for railway shops. In some other classes of shops a larger sum is necessary; in cotton mills the equipment is generally considered to have a life of seven to ten years, and in tool-building shops a life of ten to fifteen years. This annual depreciation fund is allowed to accumulate interest until the money will earn ten per cent. by replacing some machine that has become unprofitable through wear or by the manufacture of more economical substitutes. For example, milling machines have been found more economical than planers for some classes of work. Modern wheel lathes will turn out twice as many pairs of wheels per day as older machines that may still be serviceable. On some kinds of work a turret lathe will do several times as much work as an engine lathe and vertical boring and turning mills will do twice as much work of some classes as an engine lathe and occupy less space.

In the discussion that followed the presentation of the paper some strong recommendations of its suggestions were made. Mr. Harrington Emerson, of the Santa Fe system, stated that the experience on that line had taught them, however, that economy was not always secured by the use of the most expensive tools. For example, his company strengthened three old lathes which are now turning out driver tires at a lower total cost than any special tire-turning machines, although the latter do the work much more rapidly. Another aspect of the subject was referred to by Mr. W. E. Symons, of the Kansas City Southern system. It was the effect of the gradual increase in wages paid to machinists, which nobody deprecates, on the cost of work done on old machines. It is necessary in many cases to provide better tools for shops where wages have been permanently increased if the unit cost of the product is to be kept down; whether the betterments to the shop equipment are to be made by the purchase of new machinery or by strengthening the old tools must be settled after an examination of each individual case. Of course, any plan of giving the men a premium for increasing their output is likely to be of as much benefit as an expenditure for improving the equipment. A specific case of this sort was a Sellers boring mill, which turned out twenty wheels per day. Careful supervision increased the output to forty wheels. The operator was then told that his pay would be increased five cents for each wheel over forty per day, with the result that the output ran up quickly to sixty and seventy. In other words, a combination of supervision and premium was able to increase the output of a machine from twenty to seventy wheels.

The problem is altogether too big and complicated to be settled in a short article. The important thing to note is the evident general inclination at the present time to acknowledge that the old methods and old tools may be very wasteful, costing more money to retain than the expense for an improved equipment. In the system of management which rules in many large corporations, the directors, who are the ultimate authority for expenditures, are naturally conservative. The safety of the property entrusted to their care requires them to be so. If they are shown, however, that an expenditure for equipment results in an actual saving of money for the company, as a whole, there will not be much hesitation in making the appropriations. These discussions in the railway clubs and other organizations are accomplishing much good in crystallizing the general opinion on shop tool improvement, and the cost of accomplishing different classes of work. When these allied subjects are more thoroughly analyzed there will be much less difference of opinion on shop management than exists to-day.

Notes and Comments.

The International Engineering Congress in St. Louis last fall is brought to mind very forcibly by the appearance of two of the six volumes in which the "Proceedings" will be published. These volumes form a valuable summary of the general progress of civil engineering during the last ten years, and their very prompt publication (the discussions were held open until the first of the year) is an indication of the efficient editorial work of the secretary of the Congress, Mr. Charles Warren Hunt. The labor involved in bringing out such large volumes without interfering with the regular work of the American Society of Civil Engineers can be appreciated only by those acquainted with the difficulties of such work.

The Consumption of Water per Consumer in Worcester, Mass., during 1904 averaged 83 gal. per day, according to the annual report of Mr. Frederick K. McClure, city engineer. This rate of consumption is not unusually low for cities the size of Worcester, but when it is considered that a very large number of industries are supplied with water by the city, the rate is seen to be low. This good showing may be attributed to the thoroughness with which the distribution system is metered, since up to the end of the time covered by the report 95 per cent. of the service connections were metered.

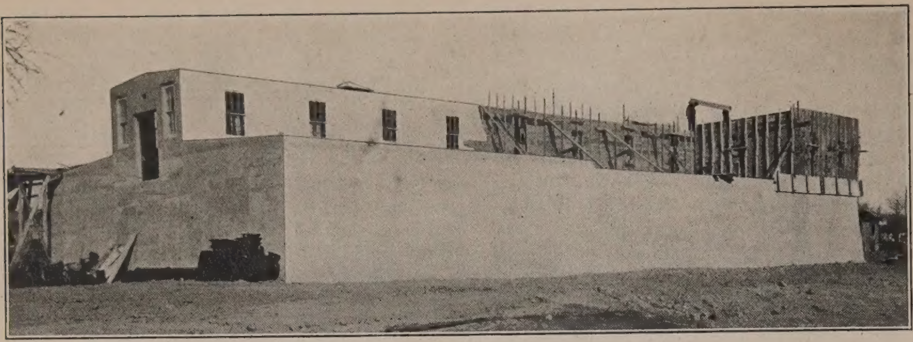
A Novel Crematory Device is used in the installation of Horsfall destructors at Gorton. Each of the four cells has a grate area of 42 sq. ft., and is provided with a drying hearth within the furnace itself, on which the preliminary drying of the refuse takes place, the fumes from the mass being cremated by passing over the incandescent fire and through a spiral flue by which all the products of combustion are exposed to intense heat. On opening the clinkering door, the fireman cuts off, in so doing, the supply of steam to the jets that cause the draft, thus automatically regulating a part of the crematory work which sometimes causes much trouble.

Defective Water Supply for fire protection was the subject of a decision by the Louisiana Supreme Court in Allen & Currey Mfg. Co. v. Shreveport Water-Works Co., 37 S. Rep. 980, which is important because the court reverses its position respecting the obligation of a water company for loss to private consumers on account of deficient water supply. The substance of the decision is given in the following extract from the official syllabus: "No liability to damages in favor of her inhabitants or corporators lies upon a city for the non-performance or negligent performance of her duty to furnish water to her fire department for protecting the property within her corporate limits from fire. Hence no duty rests upon her to impose such liability upon a contractor stepping into her shoes for performing such duty." This decision places Louisiana with California, Connecticut, Georgia, Idaho, Indiana, Iowa, Kansas, Minnesota, Mississippi, Missouri, Nebraska, Nevada, New York, Ohio, Pennsylvania, Texas, Wisconsin, and the federal courts. The contrary opinion now rules only in Kentucky and North Carolina. This divergence in the law in different States on such an important subject is an interesting instance of the complication which inevitably attends the American form of government.

The Cracking of Concrete in reinforced concrete beams has been investigated by M. Considère. He prepared two 20x15-cm. beams 3m. long, reinforced by two 16-mm. steel rods and three 12-mm. steel rods "placed round near the tension face." One beam was allowed to harden in air, its surface being covered with wet cloth, and the other beam was kept in water. When six months old they were supported at the ends and loaded by means of hydraulic presses at points 70 cm. on each side of the center. The loading was stopped when the extension of the lower surface was 0.625 mm. in 102 cm. in the case of the air-hardened beam and 1.3 mm. in that of the other. No crack could be detected with a microscope at any part of the strained surface. A slab 4½ cm. thick was then cut from the tension side of the beam just above the steel bars. These must have been subjected to an extension of 0.22 mm. per meter in the air-hardened beam and 0.5 m. in the other, but they were perfectly solid, although plain concrete generally fails under an extension of 0.1 to 0.2 mm. per meter. They were then tested by bending, and failed under a slightly greater stress than that carried by other slabs cut from the upper parts of the beams. These tests show, in the opinion of M. Considère, that the presence of steel permits concrete to elongate more than is possible when reinforcement is not present.

The Circulating Water System for the power house of the Harland & Wolff shipbuilding yard at Belfast, Ireland, includes two 20-in. inlet conduits, which lead to a 36-in. low-level pipe, and a cast-iron so-called tidal culvert 116 ft. long and 10x6 ft. in cross-section, into which the 36-in. conduit terminates. The power house lies at a considerable distance inland from the water front, but this tidal culvert, alongside the station, allows each of the circulating pumps to draw its water independently as if direct from the channel. The main generating plant comprises three 1,000-h.p. units.

Women Tracers are employed in considerable numbers in drafting offices in Northern England and Scotland, according to a letter to the London "Times," by Mr. James A. Smith. In some of the large Clyde yards they not only do all of the tracing of proposal, contract and working plans, but also work out many of the intricate calculations of displacement, the positions of metacenters and the like. In an office with which Mr. Smith was once connected, about 25 women tracers were constantly employed. They began their four-year apprenticeship at about 15 years and received from 5s. to 12s. a week during this period. Their salary afterwards was 20s. to 23s. and sometimes more. The hours were the same as for men. At these offices each plan was drawn with a view to being traced by a non-technical person, the small amount of extra work involved being repaid by the additional clearness of the details to other draftsmen having occasion to refer to it. The American system of making finished drawings on tracing cloth and duplicating them by blue-printing renders it unnecessary as a rule to employ anywhere near as many tracers as are required in British offices.



A REINFORCED CONCRETE FILTRATION PLANT AT MARIETTA OHIO.

The adoption of reinforced concrete for the building of the filtration plant at Marietta, Ohio, on the banks of the Ohio River, is a conspicuous instance of the application of this material. A general idea of the architecture and construction of the building may be seen in the accompanying illustrations taken before the completion of the construction. It is 49x121 ft. inside, with a second floor on one end to carry the sand beds over the clear water wells. The other end has a center wall through it, making two 23x75-ft. coagulating basins, and in one end of these basins a set of five tanks were built on a mezzanine floor 5 ft. above the main floor.

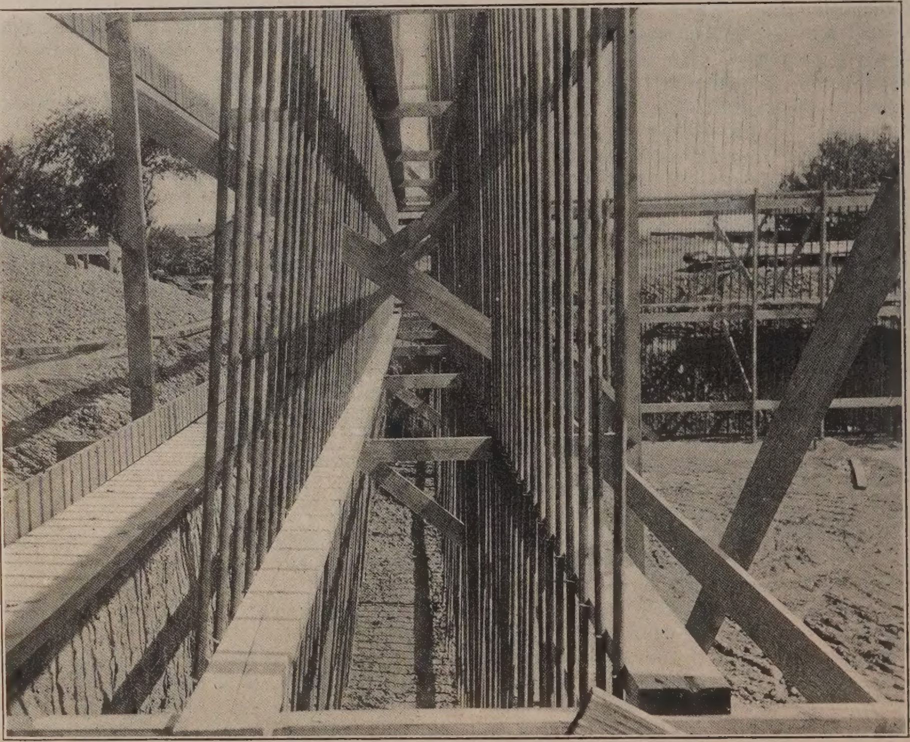
The design of the reinforcement for various parts of the building is outlined in the accompanying detail sections of the building and views taken during its construction. The illustrations show the method of reinforcing the outside walls of the coagulating basin, except that as the concrete was run in, ⅜-in. longitudninal rods were spaced on 16-in. centers. These walls are 3 ft. 6 in. thick at the bottom and 21 in. thick at the top, with their inner faces vertical, and are designed to resist a 19.5-ft. head of water. The ¾-in. vertical rods, shown in the illustration, are on 6-in. centers, with the planes of the center lines of the two rows in which they are placed, respectively, 3 in. inside the inner and outer faces of the walls. At the corners of the coagulating basin, ⅝-in. horizontal rods, 8 ft. long near the inner face of the wall and 16 ft. long near the outer face are placed longitudinally on 16-in. centers inside the main vertical rods.

The walls at the corners of the clear-water well and at the junction of the division wall between the clear-water well and the coagulating basin were similarly reinforced with 5/16-in. horizontal rods inside the regular vertical rods. The walls of the clear-water well are 3 ft. wide at the floor level and 2 ft. 3 in. wide at the lower edge of the girders supporting the sand bed floor, reinforced in the same manner as the walls of the coagulating basin with ⅝-in. vertical rods on 8-in. centers. Horizontal steel straps, ¾ in. wide, with their ends bent around rods in the opposite vertical rows, are placed transversely in all walls near the corners to reduce the tendency of the concrete to shear.

The walls of the coagulating basin were designed to meet the conditions of two assumptions: one, that they would act as a cantilever with a distributed load produced by the weight of the water; the other that they would act as a beam with a concentrated load equal to the resultant pressure of the water applied at a point equal to one-third the depth of the water from the lower end, the floor and roof being assumed to take the end reactions. No allowance was made for the earth pressure in either case, but the overturning moment of the wall was considered in the cantilever assumption.

The main reinforcement in the tank walls was placed horizontally, the rods being spaced uniformly, but the cross-sectional area of the steel was reduced toward the top of the walls.

A footing, 5 ft. wide, extends around under all the outside walls, and the center wall of the coagulating basin, and is reinforced with ¾-in. rods, 12 in. on center. A floor 10 in. thick over the entire building, and all the footings were run in at the same time the concrete in the piers under the columns supporting the sand bed floor was put in place. The piers are 24 in. thick, and each pier is designed to carry a load of 166,000 lb. The reinforcement consists of two rows of 1-in. rods, spaced 6 in. on centers at right angles to each other, and ¾-in. rods spaced 6 in. on centers diagonally across the piers.



Temporary Bracing Holding in Place the Vertical Rods in Walls of Coagulating Basin.

All of the main vertical reinforcement rods were first put in position and accurately held in place by wooden frames built for that purpose. The concrete for the floor and footings was then put down, so that the steel would be kept in position until the completion of the walls. After the walls were carried up to a height of 13 ft. 9 in., the sand bed floor was laid, and the walls then continued to the underside of the roof. The reinforcement in the sand bed floor consists of ½-in. rods, 6 in. on centers in both directions, and the reinforcement in the girders carrying the floor is shown in an accompanying illustration. The floor instead of resting on top of the girders, as is the usual arrangement, is supported at a distance of one-third the depth of the girder from the bottom, and the upper portion of the girders used as division walls for the sand beds.

In all deep-girder construction, as in the main girders for the sand bed floors, it was found that the use of round rods for shear members wrapped tightly around both chords eliminated the tendency of displacement before the concrete was run in.

For the calculation of the shear members the ordinary stress diagram for uniform load was used. It was assumed the beam would act as a multiple intersection Pratt truss with compression members inclined at an angle of 45 deg., and it was also assumed that the horizontal forces would be resisted by the shearing strength of the shear members. The spacing of these members was checked analytically by the formula, $s = da \div T$, in which s is spacing of the rods, d the theoretical depth of the beam, a the cross section of one set of shear rods, and T the total section of steel required for the maximum horizontal shear.

After the floor had set for 38 days a test was made by loading the floor with 1,040 lb. of sand and gravel per square foot, without any apparent signs of deflection, either in the floor or girders. After 45 hr. had elapsed from the time this load was applied, the load was reduced to about 600 lb. per square foot, and kept at that for three weeks.

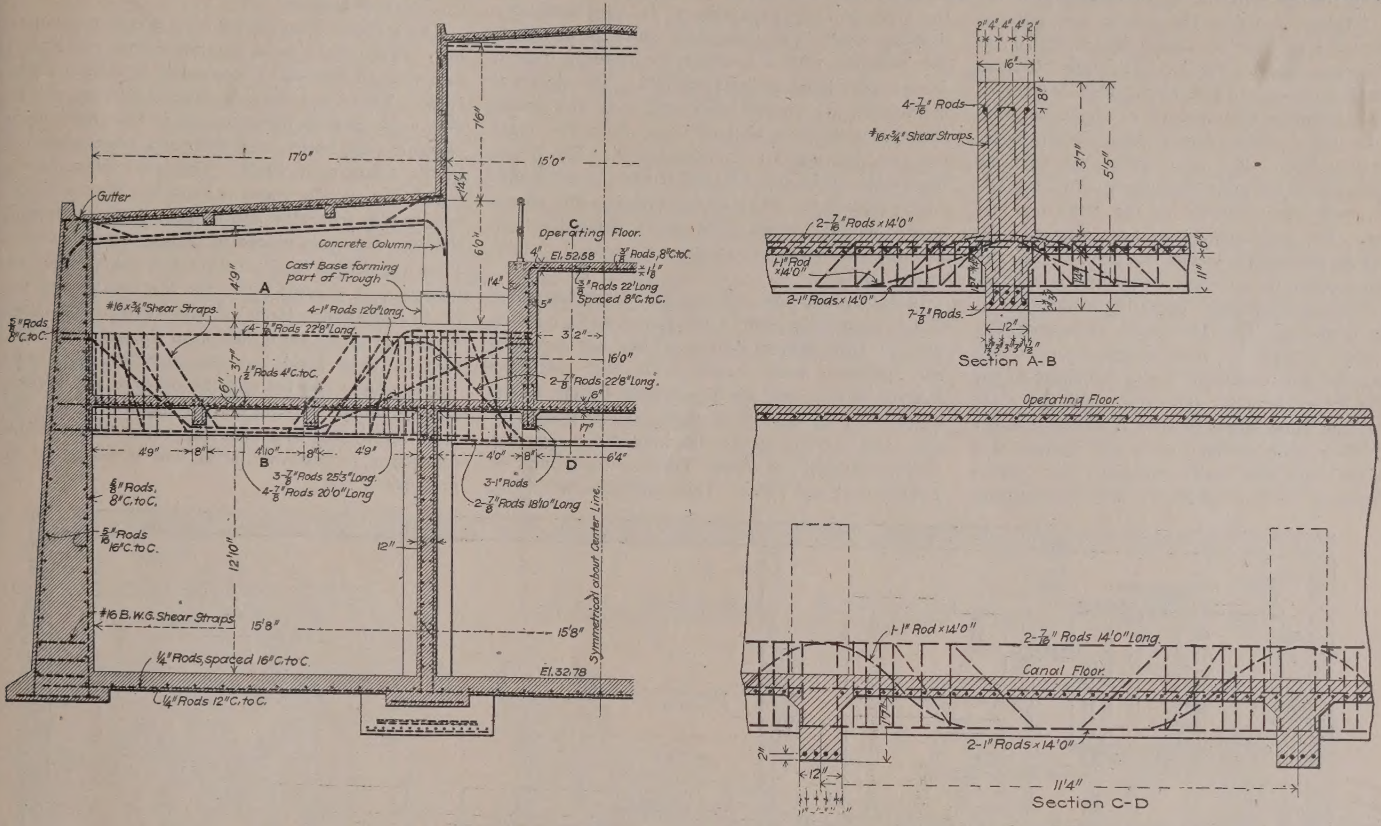
The roof over the entire building is 4 in. thick, in panels of about 13 ft. span. It is reinforced with ⅜-in. rods, transversely, 8 in. on centers and ¼-in. rods, logitudinally 12 in. on centers. The reinforcement for the roof beams is indicated in one of the illustrations. The monitor on top of the roof furnishes all the light for the building, and at one end the roof forms a floor for a laboratory. The side walls of the monitor are 6 in. thick, reinforced by ¼-in. rods, on 9-in. centers between the windows. Below the windows are two ¾-in. rods from one end of the monitor to the other, acting as a wall girder to carry the weight between the roof girders. The roof of the monitor is 3½ in. thick, carried on truss-shaped beams, and, of course, is in union with the side walls.

An interesting feature of the building is the fact that even the ventilators are of reinforced concrete, thereby making a complete concrete structure, the only other material used being in the windows and frames.

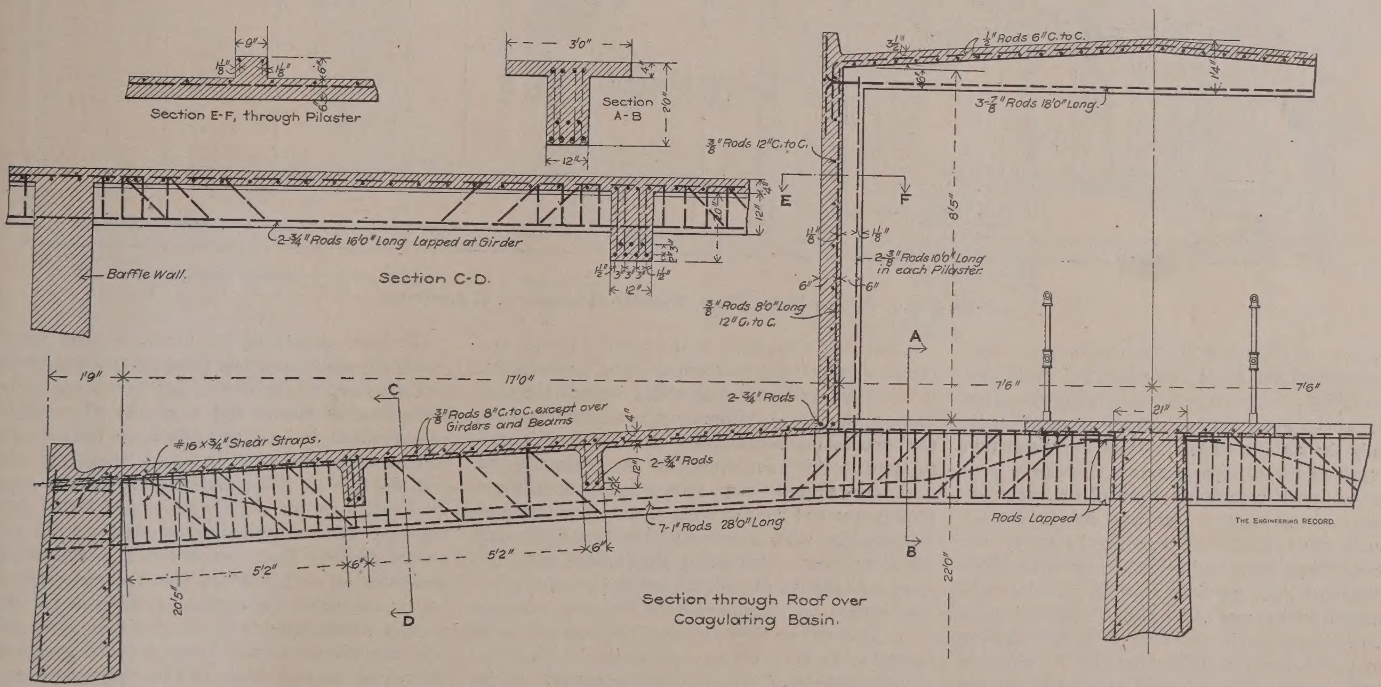
The reinforcement consists of plain steel rods of 85,000 to 95,000 lb. tensile strength, and all stresses were calculated on the basis of 16,000 lb. unit stress for tension and 10,000 lb. for shear. The sand obtained from the Muskingum River, as well as the gravel used in the concrete was all washed and screened to the size required for the various parts in the work. Alpha Portland cement was used and kept in the storehouse at the site until a seven-day test had been approved, before being used in the concrete. A Smith mixer was employed and the concrete was all put in place with wheelbarrows. Altogether some 420,000 ft. of lumber labor was required for the centering, some of the lumber being used several times. Most of the lumber was surfaced on one side and two edges and considerable of it was dressed and matched. The forms for the outside walls were made of 3x12-in. spruce, dressed and matched and made into panels 16 ft. long, used as shown in the cut at the head of this article.

After the completion of the building the inside of all walls was painted with two coats of asphalt roofing cement as a protection against leakage at the joints required in building the walls.

The reinforced concrete work described was designed and erected by the Carey Construction Co., of Cleveland, Ohio, under the supervision of W. S. Ferguson, chief engineer, according to the general plans of the Norwood Engineering Co., of Florence, Mass., who had the general contract for the entire plant. The force required on the work varied from 30 to 45 men, including a foreman, engineers and carpenters. The actual amount of time required to complete the concrete work, not including the finish on roof, floors and walls, was sixty-three 10-hr. working days.



Half-Section through Sand Beds and Details of Girders.



Section E-F, through Pilaster
3'0"
Section A-B
1/2" Rods 6" C. to C.
3-7/8" Rods 18'0" Long.
3/8" Rods 12" C. to C.
E
F
2-3/4" Rods 16'0" Long Lapped at Girder
Baffle Wall.
Section C-D.
2-3/8" Rods 10'0" Long in each Pilaster.
3/8" Rods 8'0" Long 12" C. to C.
A
17'0"
7'6"
7'6"
2-3/4" Rods
3/8" Rods 8" C. to C. except over Girders and Beams
#16 x 3/4" Shear Straps.
2-3/4" Rods
7-1" Rods 28'0" Long
Rods Lapped
5'2"
5'2"
B
C
D
Section through Roof over Coagulating Basin.
THE ENGINEERING RECORD.

Section through Roof over Coagulating Basin and Details of Roof Girders.

THE VITRIFIED WATER MAIN at Little Falls, N. Y., laid about 15 years ago, has been repaired with cast-iron pipe from time to time until only 3.2 miles of the 10.5 miles of the conduit are now clay pipe.

Steam Turbine Power Plant at a Poughkeepsie Shop.

A steam turbine electric generating plant that is a striking instance of the space economy of the steam turbine furnishes the power and lighting to the works of The De Laval Separator Co., at Poughkeepsie, N. Y. The De Laval type of steam turbine is in use, and the remarkable feature of the installation is that instead of the generating units occupying a conspicuous place on the operating-room floor, they are located on concrete pedestals above the main floor level, while the latter is given over entirely to the auxiliary machinery. The arrangement of apparatus has developed an interesting system of steam piping, and the plant generally contains much that is regarded as offering economical operating results.

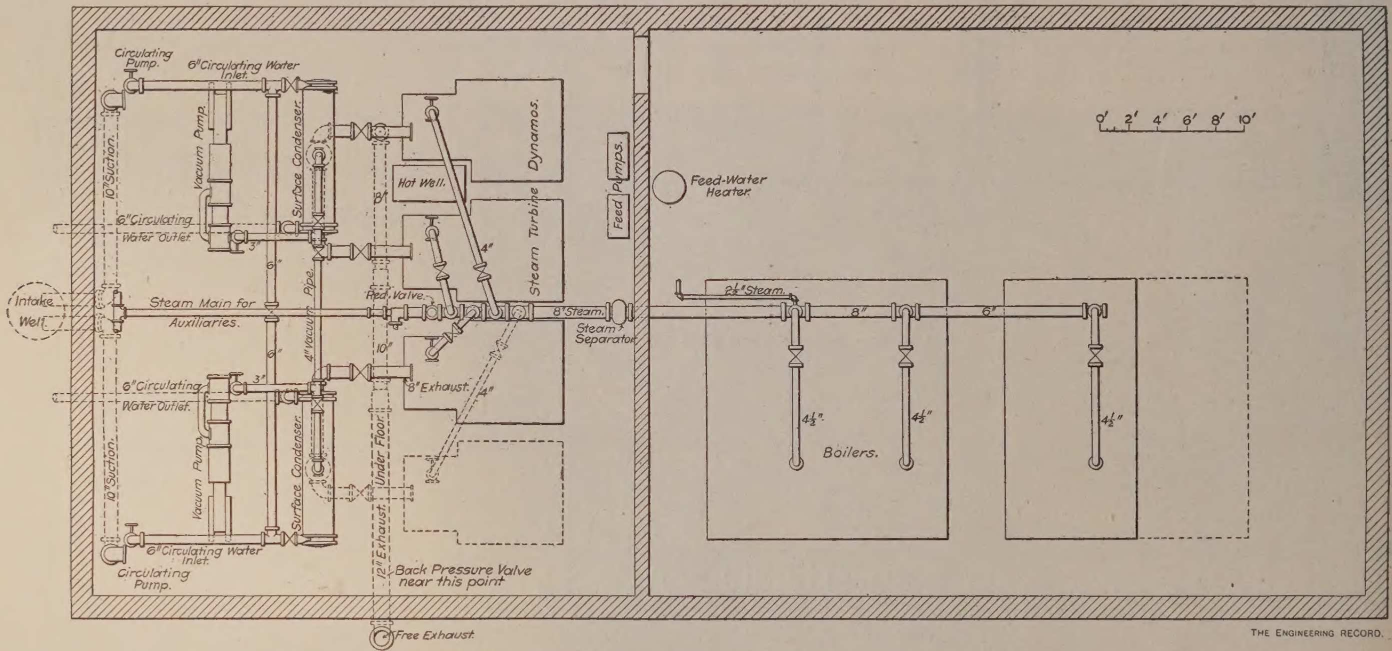
The works of The De Laval Separator Co. have been located for some fifteen years at the present site, which extends along the shore of the Hudson River between the latter and the main lines of the New York Central & Hudson River R. R. Their main product, as is well known, is a centrifugal machine built especially for cream separation in the dairy industry, and the company is the first establishment in this country to apply the patents of its sister company, the De Laval Steam Turbine Co., for developing power from steam working on the reaction principle. Individually the turbine wheels used in the steam turbine type of cream separators are not power producers of much magnitude; instead the early application of the reaction idea was due, in this instance, to the suitability of centrifugal force for the process of separation and the readiness with which the available high speed in reaction wheels could be adapted to that work. The wheels are not, however, of the same character as those built by the steam turbine works at Trenton, N. J., which is operated by an independent organization; in the separator the steam is directed tangentially against the wheel in the plane of the wheel and no speed-reducing gearing is necessary, while in the prime mover type for larger capacity, it is directed against the side or face of the wheel, at the periphery and at an angle to the plane of the wheel.

The works are driven and lighted by electricity, with some arrangements for pneumatic hoists and tools, but the new power house had to be placed at one end of the site, owing to the full occupation of most of it by the different buildings and to the desire to leave space for extension in some cases. The power house is a rectangular building 40x89 ft. in plan, with a transverse partition wall separating boiler and turbine rooms, which are thus placed end to end. The turbine room end faces the river in close proximity to its supply of condensing water, while the coal store is alongside the building, with a trestle track running over it from a coal hoist at the river end. The electrical conductors are carried overhead from the power house to the group of buildings, while the steam main for heating is run underground. The building itself is of brick with steel trusses covered with corrugated iron. The interior finish of the rooms is ornamental pressed sheet metal, painted a light green. The floors are of concrete with a cement mortar finish.

In the boiler room, which is 50 ft. long, are three Geary water-tube boilers of 125 h.p. each, built by the Oil City Boiler Works. They are arranged for operation with forced draft with McClave shaking grates and are fitted with Foster superheaters. They are hand fired, and a system of cars and narrow-gauge tracking built by Mr. Arthur Koppel, of New York, is employed to handle coal and ashes. The coal store, which has a capacity of 1,600 tons, is at present a timber enclosure rising upward from ground level to the trestle track and confining within bounds the coal there dumped. A bituminous coal suitable with the forced draft is used, and it will be of interest to state in this connection that some trouble has been experienced from spontaneous combustion. Hollow vertical flues or small air shafts formed of four planks, with numerous holes bored through all sides, were distributed throughout the coal store in order to provide an escape for any gases that should be volatilized with incipient combustion, as well as to determine the seat of local troubles. In spite of these provisions, a considerable fire developed on one recent occasion. Within the boiler room the cars are run upon a platform scales for weighing.

A section through the boiler setting is shown in an accompanying drawing. The forced draft is supplied by a Buffalo Forge fan with a 60-in. blast wheel, driven by a 5x5-in. vertical direct-connected engine, the unit being at one end of the boiler room, leaving space for a future boiler. The air is forced in the usual way through an underfloor duct to the bridge walls of the boilers, and the opening from the walls are controlled by dampers as indicated. The superheater in each boiler has sufficient superheating surface to superheat 50°. The products of combustion are conducted by steel breeching to a steel stack immediately outside the building, 54 in. in diameter and 100 ft. high. This was built by the E. Keeler Co., of Williamsport, Pa.

The working steam pressure is 200 lb. per square inch. The steam main extends across the boilers in a straight line that is continued into the turbine room. There is a notable absence of stop valves. One valve in each boiler supply to the steam main controls each boiler, and there are none whatever in the steam main itself. The latter immediately within the turbine room is provided with a Cochrane steam separator and a short distance beyond this are four tees placed in series. From each of these the steam to the turbines is taken, one tee, however, at present blank for the fourth unit yet to be installed. Each of the turbine branches, which are taken from the top of the main and carried in easy bends to the turbines, have two valves one at the tee and the other at the turbine strainer inlet. At the end of the fourth tee, the main terminates in a reducing valve which serves to deliver to the auxiliaries live steam at 80 lb. pressure.



Plan of the Steam Turbine Power Plant, Showing Arrangement of Apparatus.

The three generating units now in place are of practically equal size, two being of 75 kw. capacity and the third of 66.6 kw. Each rests on a concrete pier, as stated, and a system of wrought-iron gratings is built around them, bringing the turbine floor or deck 6 ft. 10 in. above the general floor level. The turbines are of the usual De Laval form for electric power generation, having two dynamos direct connected to the two geared shafts. Each dynamo is a direct-current generator of 125 volts. The turbines are, of course, operated condensing, and there are two surface condensers, of the Alberger type, one for each pair of units. These are also supported above the general floor, so that they come on a level with the turbines, to minimize the length of the exhaust pipes, which are notably short.

The elevated position of the main units is the result in part of the conditions of the power plant site. Formerly the area was occupied by iron works which utilized the slag wastes for filling purposes, and the porous nature of the site, together with the fact that it constitutes made land on the bank of the river made it inadvisable to attempt excavation in order to bring the turbines and boiler floors on more nearly the same level.

As a result, the auxiliary machinery is instead all disposed in well lighted positions under convenient control of the plant attendants.

Each condenser lies transversely across the turbine room, so that the exhaust connections from the pair of turbines it serves enters it at opposite ends. Each short exhaust connection is fitted with a Cochrane grease separator to protect the condenser as much as possible, and it also has a branch which drops below the floor into an exhaust main for non-condensing operation. This is provided with the usual relief valve with an atmospheric discharge of spiral riveted pipe which rises outside the building above the roof level, capped with an exhaust head.

The exhaust piping system also includes a branch main taken from the line before the relief valve is reached, so that the exhaust from the turbines may, if desired, be used for heating purposes. While this heating main is carried from the power house to the shops underground, the heating system is ordinarily supplied by an underground line carrying the 80-lb. steam, which, at the buildings, is reduced in pressure. The heating is accomplished largely by direct radiating pipe coils along the outside walls at the floor line, and the Paul system of removing air within the pipes to improve the circulation has been applied. Both the heating and power piping work, it may be added, was erected by the New York Steam Fitting Co.

The condensers, each of which has 800 sq. ft. of surface, are operated with both wet and dry vacuum pumps as usual where highest practicable vacuum is desired. The dry vacuum pumps, one for each condenser, are of the two-stage type, with a 6-in. steam and two 12-in. air cylinders and a common stroke of 12 in. The wet vacuum pumps are 4½x3¾x4 in. in cylinder sizes, and are placed underneath the condensers between the piers which support the latter. For the circulating water there is a Lawrence centrifugal set for each condenser. These pumps are direct connected to vertical engines, one unit in each outside corner of the room, with a short suction line from the intake well.

This well is practically nothing more than a 12x12-ft. hole in the slag filling of the site, which acts as a filter for water percolating through it from the river, and each of the two suctions to the pumps is protected simply by a screen of iron wire, at the inlet of the pipe. The suction lines are 10 in. in diameter, and the discharge lines, 6 in. The dry and wet vacuum lines, and the circulating water delivery to the condenser are cross-connected so that any of the condenser auxiliaries may be employed to operate the apparatus ordinarily handled by its mates.

The water supply arrangements, which may be referred to in this connection, are of considerable interest. As operated at present the condensation in the condensers is returned to the boilers, the separation of the oil from the water being effected by a machine which the company is experimenting with. The wet vacuum pumps discharge to this device and the latter handles also the oil-laden drips from the feed-water heater and from the exhaust-steam grease separators, which are first collected in a 2½x6-ft. drip tank. The cleaned water from the separating device is delivered into the hot well.

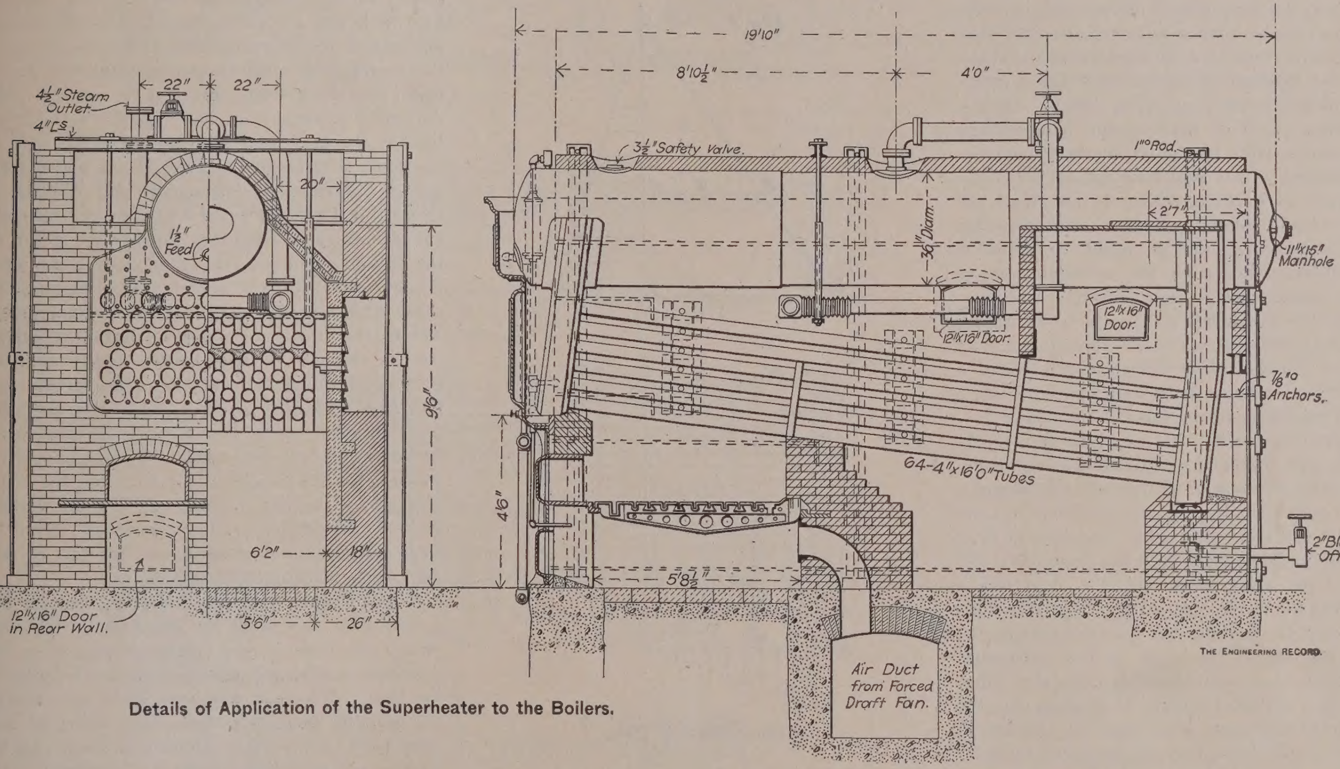
The hot well is a steel tank set between adjacent foundations of two turbine units and receives also the drainage from the live-steam lines, which drainage is trapped to it, the returns from the heating system when that is in use and such fresh water as may be necessary to make up loses. The tank is covered so as to prevent the escape of vapor into the turbine room, but has a vapor pipe to the atmosphere and an overflow to the river.

The boiler feed is ordinarily taken from the hot well, but the feed pumps may draw directly from the river or from the city water supply mains. There are two feed pumps, of the Deane duplex end-packed-plunger type, 7½x5x6 in. in size, located in the turbine room against the partition wall and underneath the turbine deck. They discharge normally through a feed-water heater which is a closed Berryman type heater, built by Messrs. Benj. F. Kelley & Son, of New York. This receives the exhaust from all the non-condensing machinery, but an interesting detail is that the steam outlets of the heater may be connected to one of the condensers, if it is desired to eliminate back pressure on the auxiliaries and utilize the heat of all the exhaust steam. In that event the atmospheric discharge from the auxiliary exhaust line is closed.

The feed main is run in a trench in the floor across the boiler fronts and it is worthy of note that the supply to each boiler is metered, a Thomson hot-water meter being placed behind the cornice of each boiler front. Another interesting detail of the boiler fittings relating to the water supply is the water gauge, which is of the so-called reflex pattern manufactured by the Wm. T. Bonner Co., of Boston, showing by an application of the principle of total reflection a black column for the water instead of a transparent column. Another feature is that the blow-off cocks of the water column on each boiler point through a slot in a vertical drain pipe which serves to catch the water.

The machinery in the turbine room includes a motor-driven Rand air compressor for supplying the works with compressed air and a 4½x2¾x4-in. Worthington duplex pump for circulating river water through the jackets of the air compressor and the dry-vacuum pumps. The compressor is a duplex two-stage machine of the flywheel type, driven by means of a Morse chain from a 22½-h.p. Milwaukee motor. The motor is automatically controlled by an electrical switch to maintain a pressure of 80 lb. The air-storage tank in the turbine room is 2½ ft. in diameter and 9 ft. high. Lubrication of the turbine-room machinery is largely supplied from an overhead tank with gravity flow and a Cross oil filter is provided to allow the use of the oil over and over again.

The electrical distribution to the works is effected by a single feeder line to the switchboards in the shops, where the circuits are controlled. The main switchboard, on the turbine deck, is therefore employed only for controlling the electrical ends of the generating units and the power-house circuits. The feeder panel contains a three-pole switch for the three conductors of the feeder and two recording wattmeters, one for each leg of the system. The feeder is protected with a circuit breaker. At the first distributing switchboard in the shops there is another circuit breaker, and the board contains the switch for the individual circuits and a switch for a subfeeder by which a second distributing board is fed. The circuits are protected with D. & W. enclosed fuses on the boards. The total connected lighting load comprises some 107 open and enclosed arc lights, and



Details of Application of the Superheater to the Boilers.

350 incandescent lamps of 20 c.p., all on 110-volt circuits, and the power load includes some 70 motors, aggregating 373 h.p. in capacity. The group method of driving is mainly in use, with ceiling motors in some cases and floor motors in others, the latter largely on concrete bases.

The power plant and the rearrangement of the heating and power distributing systems, which were undertaken with the building of the plant, were designed by Prof. William Kent, now dean of the L. C. Smith College of Applied Science of Syracuse University, and the work of installation was supervised by Mr. T. H. Miller, superintendent of the works. The officers of the company are Sir John Bernstrom, president; Mr. R. R. Bowker, vice-president; Mr. Francis J. Arend, general manager; Mr. Oscar Bernstrom, works manager, and Mr. T. H. Miller, superintendent.

The Safety of the Assuan Dam.

The controversy concerning the safety of the Assuan dam across the Nile having been taken up by letters to the daily papers in America, it is desirable to review certain facts concerning that structure. The plans made in 1890 under the direction of Sir William Willcocks were for a structure holding the river up to a height of 30.5 meters above zero of the Assuan gauge. The plans prepared later by the international commission consisting of Sir Benjamin Baker, M. Boulé and Signor Torricelli provided for an initial impounding elevation of 22.5 meters, but the dam was proportioned so that it could be raised 6 meters, thereby increasing the storage from 35 billion to 70 billion cubic feet. This dam was illustrated in The Engineering Record of Dec. 30, 1899, and is remarkable for the numerous sluices through it; in fact, it is more properly called a weir or barrage than a dam, as its purpose is the seasonal regulation of the flow of the Nile.

On March 11, Sir William Garstin sent a report to the Egyptian Council of Ministers advising delay in raising the height of the dam and explaining the reasons for his recommendations. In the early notices of this report which appeared in British and American journals, it was stated that the cause for the delay in raising the dam was a serious mistake in the original design of the cross-section, due to omitting any consideration of the upward reaction of the water in the sluiceways. The neglect to account for this important influence, it was stated, resulted in selecting for the dam a cross-section so small that any increase in its height would leave the weight of the masonry too small to resist the pressure due to an increased depth. This explanation of the reason for delay in increasing the height of the dam is hardly convincing, particularly in view of the facts stated in Sir William Garstin's report. That document is not available at this writing, but the following review of it, republished from "Engineering," may be accepted as thoroughly accurate on account of the special facilities of that journal for acquiring full information on this subject:

The alarmist character of some of the telegrams, dealing with Sir William Garstin's note, first received, find no justification in the complete document. After a careful study of the work on the spot, and further calculations, Sir Benjamin Baker agrees with the local engineers in considering the structure perfectly stable as it stands; and, indeed, many other dams designed on similar principles have been erected in all quarters of the globe. In view of the new light on the stability of dams afforded by the paper on "Some Disregarded Points in the Stability of Masonry Dams," issued last year from the mathematical department of University College, it is, however, considered imprudent to increase the existing height of the dam without much further consideration. The paper in question is due to Mr. L. W. Atcherley, who, on some points, has had the assistance of Professor Karl Pearson. The new point involved is really a very simple one, perhaps the most remarkable feature about it being that it has not been previously noted. Consider, for example, a simple triangular dam such as is represented by $A\ B\ C$ in Fig. 1, the vertical face $A\ C$ being that exposed to the water pressure. Then taking any horizontal section, such as $E\ F$, the water pressures above F have a certain bending moment about the center of this section G. The consequence is that if the triangle $A\ E\ F$ were weightless, a tensional stress would be produced at F, and there would be a liability for the masonry to crack here. This tendency is overcome in practice by the weight of the triangular section $A\ E\ F$, which acting downwards through its center of gravity, as indicated by W, has a moment round G in the opposite sense of that due to the water pressure, and consequently tends to produce a compressive stress at F. The dam is always designed so that the compressive stress due to the weight is in excess of the tensional stress due to the water pressure, the resultant stress being thus always a compression. It is also considered advisable that no tension shall be developed on the rear face of the dam. Both conditions can, as is well known, be provided for by making the "line of resistance" fall within the middle third of the structure.

Fig. 1.

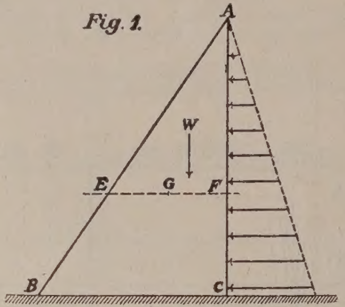
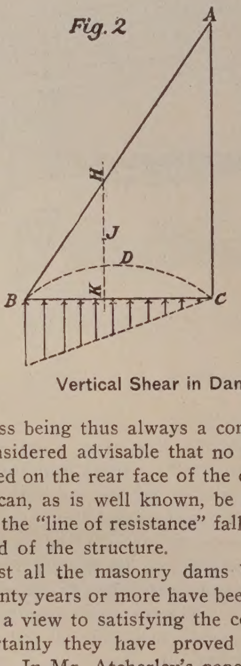


Fig. 2.



Vertical Shear in Dams.

Almost all the masonry dams built during the last twenty years or more have been designed solely with a view to satisfying the conditions noted; and certainly they have proved satisfactory in practice. In Mr. Atcherley's paper, however, it is now pointed out that the conditions in question may be satisfied, and yet dangerous tensions may conceivably exist along the base of the structure. The reactions between the dam and its foundation necessary for stability can be calculated. They consist of an upward pressure, distributed over the base, and tangential forces, preventing the dam sliding bodily. Neglecting the latter for the moment, the vertical forces may, with reasonable accuracy, be taken to have a triangular distribution such as is indicated in Fig. 2. Consider now any vertical section of the dam, such as $K\ H$. Then the upward forces to the left of this have a bending moment about J—the mid-point of the section. This moment will tend to produce a tension at K. On the other hand, the weight of the triangle $K\ B\ H$ has a moment of opposite sign, as have also the tangential forces applied to the base of the dam between B and K. If the sum of these is equivalent to a moment greater than that of the upward forces, the resultant stress at K will be a compression, if not it will be a tension, and the dam may fail by splitting along the vertical line $K\ H$, though it may appear quite safe if designed according to the theory hitherto universally accepted. In experiments on models representing a dam actually built, Mr. Atcherley found that the factor of safety against failure in this way was only some half or two-thirds that against failure by the opening of a horizontal joint.

It will be noted that the tangential forces on the base have an opposite moment to the vertical forces, and hence reduce the tendency of the dam to fail by tension at the base. The way in which these tangential stresses are distributed over the surface is, therefore, of much importance. The greater the shearing stresses in the neighborhood of the point B the smaller becomes the tendency to tensional stresses on the base. In rectangular beams subject to bending, the shearing stresses have, it is well known, a parabolic distribution, being zero at the extreme fibres and a maximum at the centre point, this maximum being one and a half times the average shear on the section. Mr. Atcherley assumes that this is also the distribution of the tangential stresses along the base of the dam. The tangential force at any point of the base is therefore proportional to the ordinate, at that point, to the curve $B\ D\ C$, the central ordinate of which is 1½ times the average shear on the section. The total force applied at any point in question can then be obtained by combining this shear with the vertical reaction at the same point. Taking the direct and tangential forces as distributed in this way, it is, of course, easy to find the resultant bending moment about the vertical section $H\ K$; and, if desired, a line of resistance for these upward acting forces can be drawn corresponding in every way to the ordinary line of resistance for the weight of the dam and the water pressure. This line of resistance for the vertical sections should fall within the middle third of each vertical section if tension on the base or rear face of the dam is to be avoided.

It will be seen from the foregoing that the importance of the point to which Mr. Atcherley directs attention is very largely dependent on the distribution assumed for the tangential forces at the base. Moreover, masonry dams are invariably partially *encastré* at their base, which in turn must have an important influence in modifying the stresses actually obtaining there. The point raised therefore requires a good deal of further consideration before it can be decided that previous practice in the designing of masonry reservoir dams has been seriously defective.

A most important step towards further elucidation of the matter is contained in Mr. Atcherley's paper, where, in conjunction with Professor Karl Pearson, he has reduced the problem, of the internal stresses in a dam, to the solution of a partial differential equation of a very simple form. An arithmetical solution of this equation, satisfying the boundary conditions to any desired degree of approximation, is always possible, whatever may be the shape of the profile; but the labor necessary is somewhat appalling to contemplate, it is stated by "Engineering," and it is to be hoped that the mathematicians will succeed in finding some more direct methods, in the case of a few simple forms at any rate. The values of the internal stresses deduced for these would then indicate the general nature of the stresses in the more complicated cases. Unfortunately, even then the nature of the result obtained will still be dependent on the assumptions made as at the conditions at the base of the dam, which it will be remembered, is the whole point at issue; so that the matter, from a practicable point of view, is not so far advanced as might be supposed.

As matters stand it appears probable that if a dam is to be treated as merely resting on a horizontal foundation, and is prevented from sliding solely by friction, Mr. Atcherley's assumptions are not far from the truth, and there is a real danger of failure by tension at the base. If, on the other hand, the dam is to be considered as "mortised" into its foundations, it is difficult to see how it could yield in the way suggested without at the same time rending in pieces the solid rock below it. The fact that masonry dams designed solely on the principle of keeping the line of resistance of the weight and water pressure within the middle third of each horizontal section have stood well seems to show that there is no necessity for engineers to neglect the assistance the dam may receive from its being mortised into its foundations.

Yet in view of the immense interests at stake, the advisers of the Egyptian Government are undoubtedly wise, in the opinion of "Engineering," in deciding not to raise the Assouan barrage at the present moment, though it is quite possible that a couple of years' further experience and research may justify the engineers in proceeding with the work at a later date. For other reasons the postponement is not entirely a misfortune, as it appears that speculation, in the improvement of land values by irrigation, is threatening the prosperity of the country. This gambling fever may receive a timely check by the knowledge that the intended works may not only be postponed, but may, perhaps, be absolutely abandoned. In any case, in view of the doubts raised by Mr. Atcherley's paper, the engineers to the structure must congratulate themselves on the fact that the dam in the prospect of having its height subsequently raised was made much stronger for its actual load than the older theory indicated as necessary. Sir Benjamin Baker has consequently been able to entirely reassure the Egyptian authorities as regards the existing state of affairs. There has, it is true, been some erosion of the rock at the tail of the dam, brought about by the discharge from the sluices. This has not, however, in any point yet advanced nearer than some 40 ft. or 50 ft. from the tail, and protective works are being undertaken to limit the extent of the damage, so as to prevent any possibility of the undermining of the dam.

The New Garbage Crematory at Atlanta.

There has recently been constructed at Atlanta, Ga., a garbage crematory rated at 200 tons of garbage, dead animals and combustible refuse per day. It is stated by the officials of the city to be operating successfully, without smoke or odor, at a cost not exceeding 19 cents a ton for labor and fuel. It is located in the business center of the city near the new union railway station, and is of the same type as that built at Minneapolis about four years ago.

The Minneapolis crematory was fully illustrated in this journal on October 5, 1901. It has two cells, each rated at 50 tons in 24 hours. Each cell is really a boiler, built with a large open interior space like the firebox of a locomotive boiler. At the bottom of this space are the grates on which the fire is maintained, while above them are pockets formed of water tubes. These tubes are a part of the boiler and the evaporation in them is so rapid that each cell furnishes considerable steam. The garbage is dumped into the pockets and dried; when the moisture is driven off it falls through the openings between the water tubes into the fire below, where it is burned. The cost of repairs on this plant has been less than $20, and the total cost of running it does not exceed 25 cents a ton for labor and fuel.

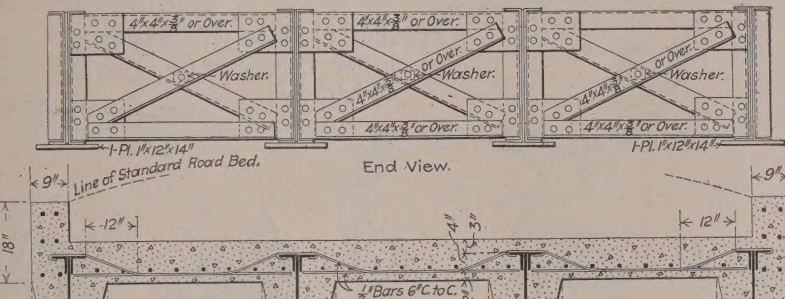
The plant at Atlanta so closely resembles that at Minneapolis as to render any illustration of it unnecessary. Some improvements have been incorporated in it as thhe result of the experience gained in the last few years. It is 50x100 ft. in plan, with ten dumping chutes and a steel stack 200 ft. high and 6 ft. in diameter. Special provision is made for disposing of swill. Refuse of this character is dumped into hoppers and the liquids are drained off before it reaches the pockets formed by the water tubes. These liquids and all others that come from the garbage pass into a pan below the fire grates, where they are evaporated without causing any offense. Another improvement is a grating of narrow, thick tile bars placed directly in front of the opening into the flue. The flames from the fire keep this tile at a high temperature, and the gases that pass through the grating are probably burned more completely than is the case where they pass freely into the stack. In a plant located as centrally as that at Atlanta the combustion of the gases is very necessary, and a special gas consuming chamber has been built between the incinerator cells and the stack. In this chamber the gases pass through the flames of two auxiliary fires and also through a spray of water, which removes the dust.

It might be added that in this type of crematory wet garbage and refuse are never dumped on the bright fires on the lower grates, thus smothering them and causing offensive odors. By holding the wet garbage on the upper water-circulating grates immediately over the fires, the flames and heated gases pass under and through the refuse on their way to the flue. The area of the upper grates in which the garbage is dried is about twice that of the lower grates, owing to their inclined position. The latter have 50 per cent. metal and 50 per cent. openings of ⅝ to 1 in. The narrowness of these slits makes it certain that all material is thoroughly burned before it drops into the pan below.

Encasing Old Girders in Concrete.

Reference was made a few weeks ago to the suggestion of Mr. B. J. Arnold to strengthen the steelwork of the Union Elevated Loop in Chicago by surrounding it with reinforced concrete. The accompanying drawings show the somewhat similar system used with entire satisfaction by Mr. A. O. Cunningham, bridge engineer of the Wabash Railroad, on several structures on that line for over two years.

The stringers are taken from old bridges and are so encased as to form part of a solid floor structure. It will be noticed that the stringers directly beneath the track are strengthened by placing rods near the bottom flanges in the concrete.

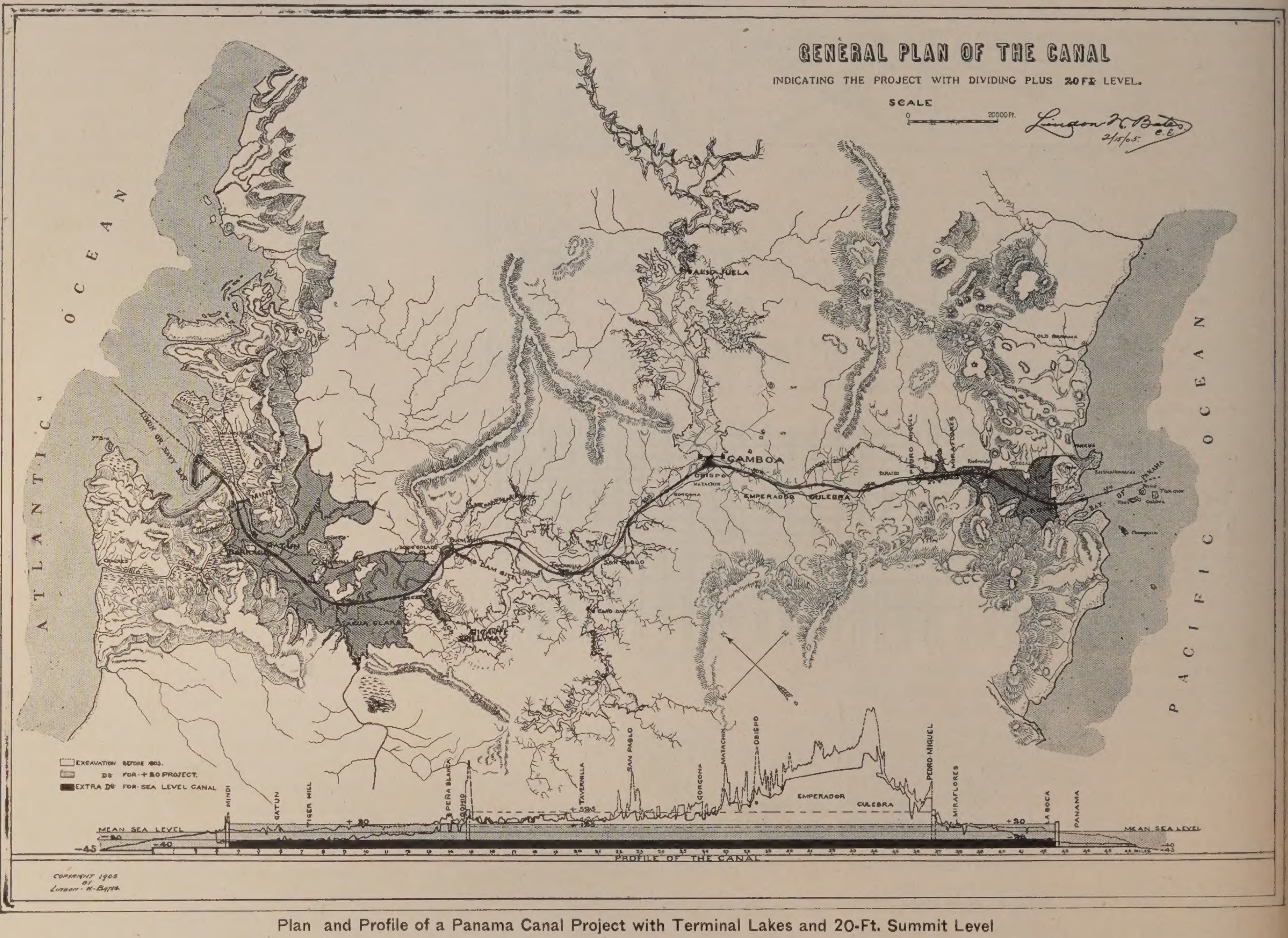


Solid Floor Bridges Made from Old Stringers, Wabash R. R.

THE POWER REQUIRED FOR CUTTING steel and iron in machine tools has been investigated by Prof. J. T. Nicolson, of the Municipal Technical School of Manchester, England. With a cutting angle of 80 deg. for cast-iron (tool angle 75 deg.), and of 70 deg. for soft steel, he found 2 h.p. were needed per pound of chips per minute. To this must be added the power required to drive the lathe light. He states that it does not pay to adopt that angle at which the cutting force is least, since the tool lasts longer with a much larger angle. A peculiar feature he has noticed with high-speed steel is that the wear is not at the point of the tool but some distance back from it. This is due to the hot turnings striking the tool at this place.

A New Plan for the Panama Canal.

It was announced last week that among the duties to be taken up by the advisory engineering board of the Isthmian Canal Commission would be the consideration of a new project for the Panama Canal submitted by Mr. Lindon W. Bates. This announcement gains interest from the fact that one of the engineers who will pass on the plans is Mr. Wm. Barclay Parsons, who is associated with Mr. Bates in a large contracting company incorporated a few days ago. The project is a novel one, and is a river canalization rather than a strictly canal proposition, and was doubtless suggested to the author by his intimate knowledge of European canalization works. It is best understood by considering the projects thus far contemplated for a canal at the Isthmus. There are four of them to be compared with the Bates plan.



Plan and Profile of a Panama Canal Project with Terminal Lakes and 20-Ft. Summit Level

I.—The project of the Comité Technique of the new Panama Canal Co., strongly advocated by General Abbot, has a summit level 62.5 ft. above the sea level. It called for dams at Bohio and Alhajuela, and a spillway at Gigantè.

II.—The 1901 project of the former Isthmian Canal Commission had an 85-ft. summit level, and the Gigantè spillway was also one of its features.

III.—Recently a 30-ft. summit level canal has been mentioned by the Commission, but very little information concerning it has been published.

IV.—The sea level project was advocated years ago, then dropped, and has finally been recommended again by Messrs. Burr, Parsons and Davis. It calls for a tidal lock, a dam at Gamboa and works for conducting away the waters of the Chagres.

All these projects call for a high dam either at Gamboa or Bohio, for great works to remove the flood waters of the Chagres, and for heavy excavation with steam shovels. The Bates project differs from all of them in each of these three points. Instead of high dams it contemplates low-head sluice barrages and dams of moderate height on rock bottom to control the catchment basins and the Chagres. The flood water of this river is to be held in large basins, one beyond the other, and is to be fed gradually into both the Atlantic and Pacific. The new plan contemplates submerging the swamps at the termini by artificial lakes and substituting dredging for steam shovel excavation in those places where the danger to the health of the men is greatest. In a general way the Bates project may be summarized as follows:

Passing Colon, a vessel will steam into the Atlantic entrance to the canal at the head of Limon Bay. The first lock close to the entrance will lift the vessel 20 ft. into Lake Chagres (artificial), losing no time since transit papers can be meanwhile secured and other necessary business transacted. Through the lake for 11¾ miles the allowable speed will be double that through a constricted channel. Bohio, where channel navigation begins in Project "A" or Lake Bohio in Project "B," will be reached in 1 hour and 20 minutes after leaving the lock. At Obispo will be passed the basin where the regulated waters of the Chagres are to be diverted, half flowing into the Atlantic and half into the Pacific, while comparatively low dams at Gamboa and Alhajuela feed the Chagres gradually into the basin with diverging outlets. At Pedro Miguel, Lake Panama (artificial) begins, through which nine miles an hour can be made. During the ship's necessary stay in port she can pass the second lock, take on coal, passengers, etc., at La Boca. The total time of actual canal transit being, for the largest type of vessel, 8½ to 9 hours.

The Bates plans are for a waterway having a larger prism than that adopted by the Commission, which is 7,150 sq. ft. in firm earth and considerably less in the Culebra cut. This section could not be used safely by large vessels like the "Baltic" or "Deutschland," Mr. Bates states, because not only depth but surface width is needed for steering. His project is based on a safe speed for the largest vessels of 5 knots an hour in the most restricted channels. To make this practicable he employs a depth of 40 ft. instead of 35 ft., as adopted in the Commission's reports, and a bottom width of at least 150 ft. The steepest side slope is taken as 2.5 to 1, giving a minimum cross-section of 10,000 sq. ft., except in the Culebra cut, where steeper slopes are practicable and an 8,000-sq.-ft. section is suggested.

The summit level of the Bates project extends from Mindi to La Boca, with twin locks at each end. The author of the projects believes that the water at the locks should be regulated at about 20 ft. above sea level. An alternative plan with additional locks and a higher summit level is also presented. Its cost is estimated at about the same sum as the recommended plan, and as its novel features are the same as those of the project favored by Mr. Bates, it need not be considered further at this time.

At both the Atlantic and Pacific ends low-level lakes will be formed by embankments connecting the hills east and west of Mindi and by a barrage across the Chagres. The northern lake—called Lake Chagres in Mr. Bates' plans—has an area of 29½ sq. miles and will extend from Mindi several miles above Bohio. The other—called Lake Panama—will have an area of 7 sq. miles. Alternative locations for these low-level locks are suggested, but it is unnecessary to mention them here.

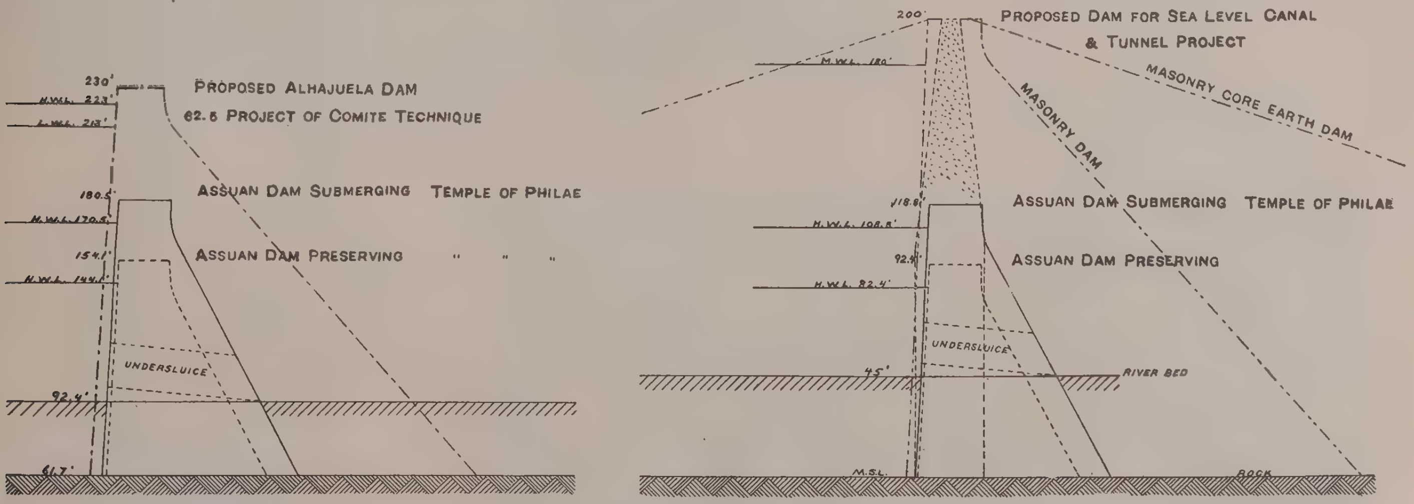
All tributaries of the Chagres on the east side, between Mindi and Bohio, will flow into the new Lake Chagres, and the western tributaries between the dam and the Gigantè will also empty into it. The Pena Blanca swamp and the Rio Gigantè will go into the submerged Agua Clara swamps. It is proposed to build an embankment between the canal channel and the Pena Blanca swamp and submerge the latter about 7½ ft.

All the tributaries on the west side of the central section of the work are insignificant except the Rio Cano, and provision is made for it by a barrage. At Obispo it is proposed to construct a triangular junction basin from which water will flow toward both oceans. From this basin towards Lakes Chagres and Panama, the cross-section of the waterway will be gradually expanded to take care of the central valley drainage which is allowed to enter the channel. A low velocity of flow can be assured, in Mr. Bates' opinion, by the same means followed in the regulation of tidal rivers like the Weser, Scheldt and Brisbane.

Two main dams are contemplated by this project, both with sluices in them like those at Assuan on the Nile. The Gamboa dam is to control the runoff of the Gamboa basin and the regulated outflow from the Alhajuela basin. The Alhajuela dam is to regulate the upper Chagres. Mr. Bates estimates that these dams will enable the current in the canal to be kept at 3 ft. per second or less, an amount which frequently prevails in portions of the Suez Canal. The minimum discharge of the Chagres will afford all the water needed for canal purposes, including lockages.

This project makes few departures from the general route of the canal proposed by the Commission. It will be 41½ miles long, exclusive of the dredged channels in Limon and Panama bays, and of this length 17¼ miles is practically lake navigation. This lake navigation below Bohio depends on the possibility of constructing barrages like those built on sand at Asyut in Egypt.

The financial aspect of the work receives special attention in Mr. Bates' discussion of his plans. His figures are as follows: Cost of canal, $197,000,000; interest at 2 per cent. for 10 years on $50,000,000 paid for canal zone and old company, $10,000,000; interest on $147,000,000 for 5 years, $14,700,000; deficit in operation in 1915-16-17, $12,000,000; total capital to be provided, $233,700,000. The interest on this capital at 2 per cent. is $4,674,000 and to this sum must be added ¾ per cent., or $1,752,750 for sinking fund and contingencies, and about $2,000,000 for operating expenses, making a total fixed charge annually of $8,426,750. Arguing from these figures and the probable receipts at $1 per ton toll, Mr. Bates concludes that to avoid a large annual deficit not more than $145,000,000 should be spent for construction purposes, in addition to the present expenditure. "There is nothing which now warrants," he says, "a sea level canal requiring $230,500,000 additional and returning for it a channel too small at any price. There is, however, every warrant in commercial outlook and in military necessity for a canal costing an outlay, aside from interest, of the $145,000,000 of the money allotted by Congress in the Spooner Act." Mr. Bates states that his project can be executed for less than this sum.



ALHAJUELA DAM SITE GAMBOA DAM SITE

Profiles for Dams in Bates Project at the Alhajuela and Gamboa Sites Shown by Dotted Lines.

The Government Work in Forestry.

Very few engineers appreciate the great development of the government's forestry work and its importance to many engineering undertakings. A good outline of the work is afforded in an address recently made before the structural section of the Engineers' Society of Western Pennsylvania, by Mr. O. W. Price, associate forester, Bureau of Forestry. This Bureau will have about 800 members, and an appropriation of nearly $900,000 during the coming fiscal year. Six years ago it was merely a division of the Department of Agriculture, with ten members and about $20,000 a year for its work. It had to make its influence felt and to demonstrate its usefulness; that it succeeded in doing so is evident from its present organization and the scope of its work.

The work of the Bureau of Forestry is of four main kinds: It co-operates by practical assistance and advice in forest work which not only benefits individual co-operators, but is of help to many others. It attacks, independently, those urgent forest problems of national importance. It administers the National forest reserves. It publishes and distributes the results of its investigations.

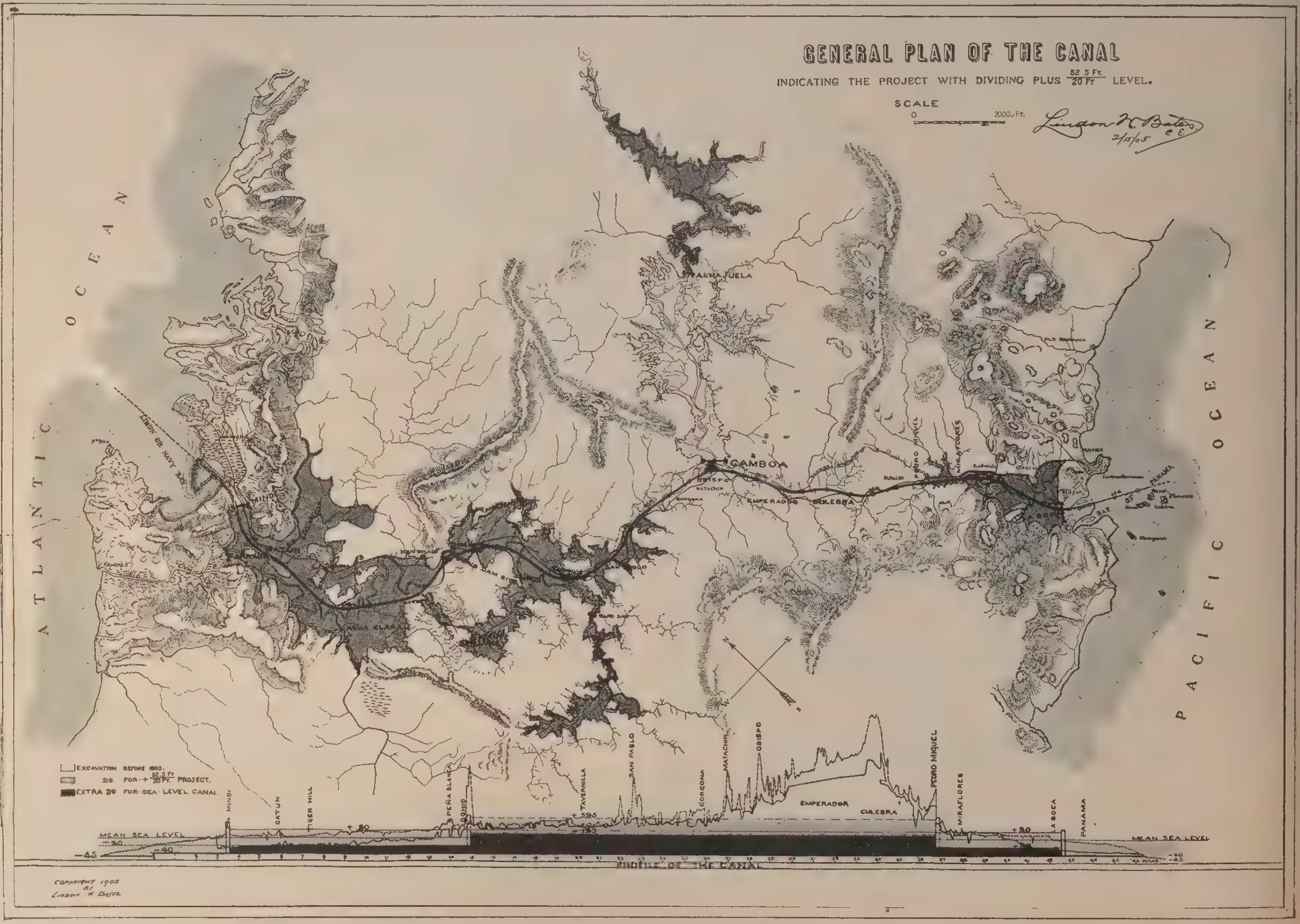
Its co-operative work is a powerful influence in bringing about the application of practical forestry to private lands. It comprises a definite offer by the Government, through the Bureau of Forestry, to co-operate with the owner of forest land, whether a woodlot of a few acres or a timber tract of a million or more, in the study needed to reach a comprehensive plan for the conservative management of the forest. This work is done under an arrangement by which the Bureau directs the work and pays part of its cost. The results are used by the forest owner in co-operation with whom the study was made in applying conservative management to his forest. They are also used for publication by the Bureau, and therein lies the wide value of the co-operative work.

So effective was the co-operative work of the Bureau in forest management, that it led to an offer of similar assistance in tree planting, which has also met with great success. The latter has been particularly valuable in encouraging tree planting upon the treeless plains of the West, where they are so urgently needed, both as protection against wind and snow, and also for the production of wood for farm uses. And the co-operative work now offers assistance also in studies of the most conservative and profitable methods for the use of the products of the forest. Among these are the studies which the Bureau is making in co-operation with railroad companies to find the best methods of seasoning railroad and construction timbers and lengthening their life by preservative treatment; its studies to develop methods of turpentine orcharding which will ensure permanence to the naval stores industry; and in many other ways, investigations aimed at economy in the use of forest products. As the direct result of its co-operative studies with private forest owners, the Bureau has undertaken along similar lines co-operative studies with States. For example, it has just completed a forest study in co-operation with California, under an appropriation of $15,000 by the State and a similar expenditure by the Bureau. This study was made to provide a basis for effective state forest legislation—for the institution of a definite and comprehensive state forest policy.

The co-operative work of the Bureau, in all its branches, has had two important results. It has been the means of getting forestry into effect in specific instances, and it has thus provided a series of object lessons of great and increasing value. The question may naturally occur, why should the government take up this work? The reply made by Mr. Price is, that there are no private foresters available to do it. It will be a very pleasant day to the Bureau when the co-operative work can be turned over to private foresters in its entirety, because it will mean that practical forestry is definitely established as a private enterprise in this country and not purely as a Government venture. But in the meantime, the Government is carrying the work because it is urgent work which permits no delay. The 500,000,000 acres of private forest lands must continue to yield most of the country's timber supply. Their misuse is a national danger, their better use a national need.

The independent investigations of the Bureau include the study of those urgent forest problems which materially affect the development of the great industries dependent upon wood. It is held by the Bureau to be the duty of the government to map this country, because maps are essential to its development, and their preparation is generally beyond the means or the knowledge of the individual. In just the same way, it is a national duty to put in the hands of the people knowledge required for the best use of the forest and its resources, and unobtainable through private enterprise. The scientific work of the government throughout is attacking problems national in their importance whose solution is beyond the power of the individual. Under this policy the Bureau is making comprehensive studies of commercial trees, which are useful in plans for conservative forest management and to wood users generally. It is making practical studies of forest fires, upon which to base legislation against them and from which to derive effective measures for fighting them and preventing them on the ground.

In a similar way, the timber tests now being made by the Bureau at four laboratories are yielding the knowledge of the strength of commercial timbers without which the fullest economy in their use is impossible.



Plan and Profile of a Panama Canal Project with Terminal Lakes and 52.5-Ft. Summit Level.

The forest yields and volume tables being prepared by the Bureau are in effect the tools, the necessary initial equipment, for conservative forest management in all parts of this country. In its forest maps, its dendrological studies, and in many other ways, it is providing the great industries dependent upon the forest with knowledge essential to their development.

Until Feb. 1, 1905, the Bureau could, under the law, merely advise regarding the technical management of the reserves. On that day, the bill transferring the forest reserves to the Department of Agriculture became law, thus consolidating the forest work of the government in the department best equipped to handle it. The administration of the national forest reserves is no small matter. It comprises the care of over 60,000,000 acres of forest land west of the Mississippi River, which is of great and increasing importance as a source of timber supply, for grazing, and, above all, for the conservation of the water upon which the future of our arid lands depends. The relation between forestry and irrigation in the West is vital and intimate. The irrigation law of the government which expends, as you are aware, several millions a year in great irrigation works under an arrangement by which the purchaser of irrigated lands will pay a tithe of the cost of irrigating it, is fruitless unless the water continues to run. And that it assuredly will not do, unless the headwaters of the streams which can be used to irrigate arid lands are protected. Unless these mountain forests are preserved, there will be periods of low water and periods of flood, characterized by a constantly diminishing annual stream flow. The importance of the reserves to grazing, to the live stock industry, is direct and vast. A large part of the summer range is in forest reserves. The grazing grounds in forest reserves fed 2,450,000 head of stock last year. The forest reserves affect mining, because it is mainly from them that timbers used in the mines must come. They affect railroads through their influence upon the industries upon which the development of the transportation systems depends.

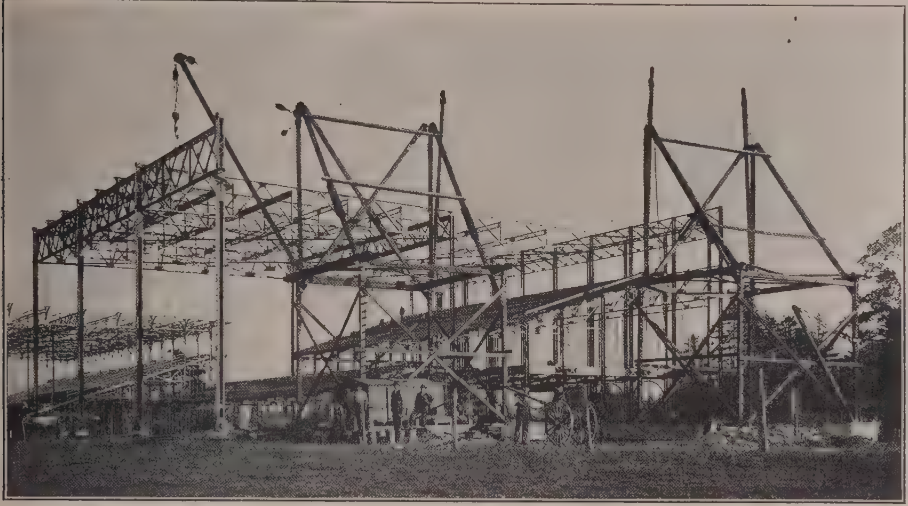
To sum up, the forest reserves furnish, and they alone can furnish, wood and water, the two things more essential than any others to the development of the West. How great the development of the West will be under the proper care and extension of the forest reserves, no man can say. The policy of the Forest Service in its administration of this great national forest property is, to devote it to the permanent well being of all, not to the temporary benefit of a few. The point of view which will animate the administration of the reserves is that all their resources are for use. And where conflicting interests must be adjusted, and there are conflicting interests upon the reserves as, for example, among sheepmen and cattlemen, the policy will be to decide the question always from the standpoint of the greatest good for the greatest number in the long run. Such an administration is not possible by the mere promulgation of general orders from Washington. It is possible only through the settlement of local questions on local grounds and only after a thorough knowledge of local conditions has been obtained. And this is the way in which the Bureau is going at the work.

Under the fourth line of endeavor, the publication and distribution of the results of its investigations, the Bureau is getting the knowledge it gathers before the people in its bulletins, in a simple and direct form. The aim of the Bureau is, that they shall contain not material of purely scientific value, but practical recommendations for the best use of the forest and its products, based on thorough study.

Special Artesian Well Pumps are employed by the Water Department of Memphis. The 64 wells are spaced far apart, in order to reduce their effect on each other, and independent pumps discharging directly into the street mains have been undergoing test for some time. Difficulty was experienced in securing from manufacturers a well pump which would discharge into the mains under considerable pressure, and Mr. Thomas T. Johnston, the consulting engineer of the department, accordingly designed one. This has now been in use for more than a year, with such satisfactory results that this type has accordingly been adopted by the Commissioners.

The Belmont Park Steel Grandstand.

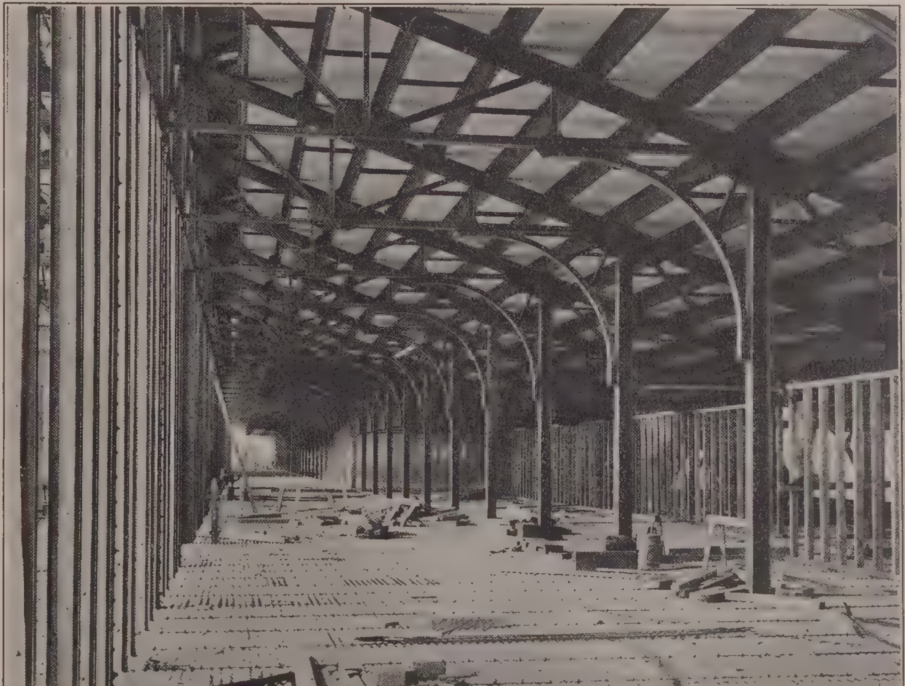
The race course at Belmont Park on Long Island, near New York City, is provided with a steel grandstand 116 ft. wide, 650 ft. long and about 55 ft. high, which has a seating capacity of 11,000, contains about 4,500,000 lb. of structural steel, and cost about $450,000. It is located opposite the judges' stand, between the club-house and the field stand, as shown in the general plan published with a general description of the park in The Engineering Record of March 11. Care was taken in the design to give it an attractive appearance, to afford unobstructed views of the track for all occupants, to avoid any possibility of exposure to inclemencies of weather while providing ample openings for fresh air in the hot months, to secure safety and rigidity of construction under possible excessive loading from dense and excited crowds, to insure permanence and moderate first cost. Considerable difficulty was involved in adjusting so many requirements, and the chief engineer made a comprehensive preliminary investigation of them in connection with the architectural and structural studies, aided by specialists, so as to secure results which are considered by the owners to be abundantly satisfactory.



Erection of the Belmont Park Steel Grandstand.

The roof trusses were proportioned for the dead load and 30 lb. live load per square foot, and for a minimum total load of 50 lb. per square foot except where roof seats are provided and the live load is assumed to be 100 lb. per square foot. All floors are proportioned to carry the dead load and 100 lb. per square foot live load, and a minimum of 150 lb. total. Wind pressure is assumed at 30 lb. per square foot for large and at 60 lb. for small vertical surfaces. The maximum working stresses allowed are: for plain tension members and for the outer fibres of I-beam flanges, 15,000 lb. per square inch; for compression members, 13,500 — (50 $L \div R$), where L is the length and R is the least radius of gyration, both in inches; for combined bending and direct stresses, 15,000 lb.; shear on pins and rivets, 10,000 lb.; extreme fibre stress on pins, 20,000 lb.; shear on web plates, 6,000 lb.; bearings on stone masonry, 300 lb. per square inch.

The most favorable location of the building was carefully determined by plotting lines of sight from all the seats to the principal points of interest and shifting positions until none of them were obstructed. Observations and charts of the position of the sun at different hours and seasons were made, and the inclination of the rays was also plotted, and the roof was built to shade all occupants at all times. The arrangement is substantially that of a single inclined tier of seats facing towards the northeast, inclined about 1:3 towards the track, and covered by a flat roof that projects 26 ft. beyond the front row of seats, and is about 45 ft. above them. Five tiers of seats are built with a steeper inclination along the front cresting of the roof with a separate framework seated on the main trusses. The main tier of seats is broken in the center by a mezzanine corridor about 12 ft. wide, which extends from end to end of the building, and serves as a promenade and to give access to both upper and lower seats. A similar gallery, 11 ft. wide, extends along the upper side of the seats at a height of about 44 ft. above the ground. The lower seats are about 6 ft. above the race track, but are about 9 ft. above the ground at that point because there is a depressed promenade in front of them to permit people to pass without obstructing the view.



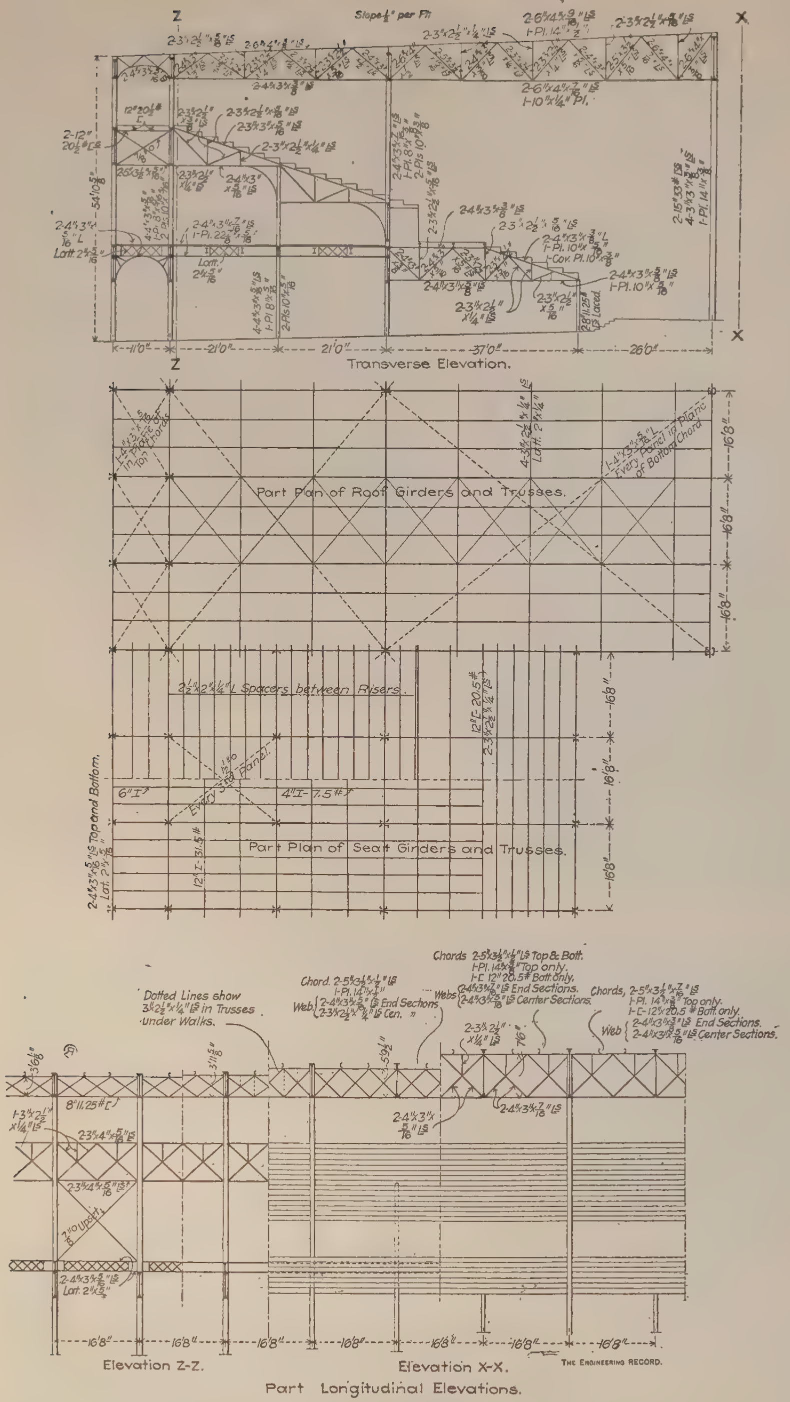
Mezzanine Story of Grandstand.

There are stairs at the rear of the building to a corridor underneath the upper rear platform, and at the same elevation as the mezzanine floor with which it is connected by a number of transverse passages which have at their outer ends double flights of wide, shallow stairs, giving access to the lower side of the upper tier of seats. Access to the upper corridor is given by similar stairs in the rear corridor. The roof seats are reached by stairs in two corner towers. The entire lower story of the building has a concrete floor, and is occupied by large toilet rooms, police headquarters, buffets, etc. The intermediate story, under the upper seats, is occupied by the kitchen, dining rooms, storage rooms, and ladies' rooms. The upper part of the building is not enclosed except for a curtain of galvanized corrugated iron about 8 ft. deep, which covers the ends and sides of the roof trusses. The intermediate story has corrugated iron walls on the rear and on the east end; the lower story and west end walls are of brick.

The floors and roof are supported by 52 main columns in four longitudinal lines, and are arranged to form thirteen transverse bents with the roof and floor trusses. The depth of the trusses is increased where necessary by curved knee-braces, which, with the rigid riveted connections to the columns and portal and sway-bracing in the rear corridor, is calculated to afford abundant resistance to the transverse bending moment that can be developed by wind stresses in the columns.

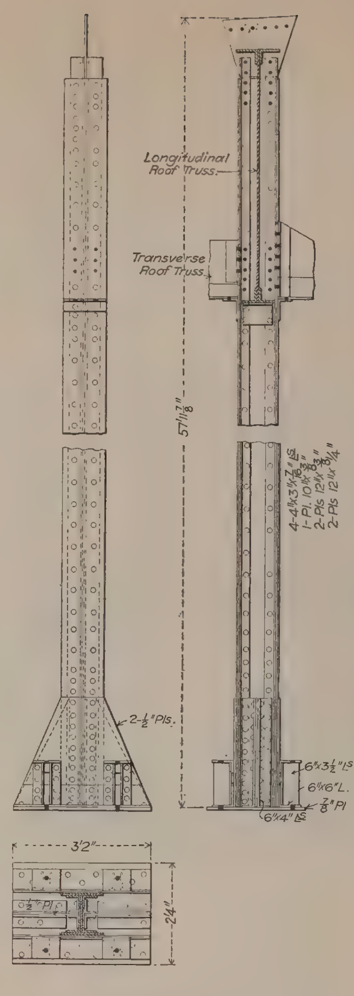
The tops of the outer and center rows of columns are connected by longitudinal lattice girders which, in each main 50-ft. panel, support two intermediate roof trusses carrying six intermediate lines of girders about 14 ft. apart, which have I-shape cross sections, made with two pairs of 3x2½-in. angles latticed. These support the flat roof covered with felt, slag and tar waterproofing. The main roof of the grand stand and field stand are graded slightly from front to rear so that all rain water is carried off by a line of leaders at the rear; by this arrangement only the wash from the overhanging hood is taken by the front leaders.

Each panel between main columns is X-braced by 4x3x5/16-in. angles in the planes of the top and bottom chords of the roof trusses. The trusses for the seats are supported on the main columns and on an intermediate independent short column in each main bent, and there are transverse bents of five short columns to support the intermediate seat trusses, spaced 16 ft. 8 in. apart. These columns also support the girders for the intermediate floor which is made with solid concrete slabs, 3 in. thick. The seat tiers are like broad shallow steps, with treads 36 in. wide made of 2⅝-in. reinforced concrete slabs in continuous lengths, made in position with expansion joints 50 ft. apart. They are supported on the upper and lower flange angles of

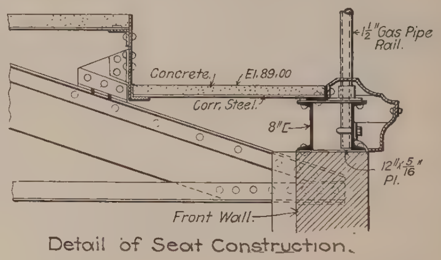

Z
X
Slope ½" per Ft.
Transverse Elevation.
-11'0"- -21'0"- -21'0"- -37'0"- -26'0"-
Part Plan of Roof Girders and Trusses.
2½x2½x¼"L Spacers between Risers.
6"I
4"I-7.5#
Part Plan of Seat Girders and Trusses.
12"I-31.5#
16'8"
Dotted Lines show 3½x2½x¼" Ls in Trusses under Walks.
Chords 2-5½x3½x½" Ls Top & Bott. 1-Pl. 14x⅜" Top only. 1-[12" 20.5# Bott. Only.
Elevation Z-Z.
Elevation X-X.
-16'8"- -16'8"- -16'8"- -16'8"- -16'8"- -16'8"-
The Engineering Record.

Part Longitudinal Elevations.

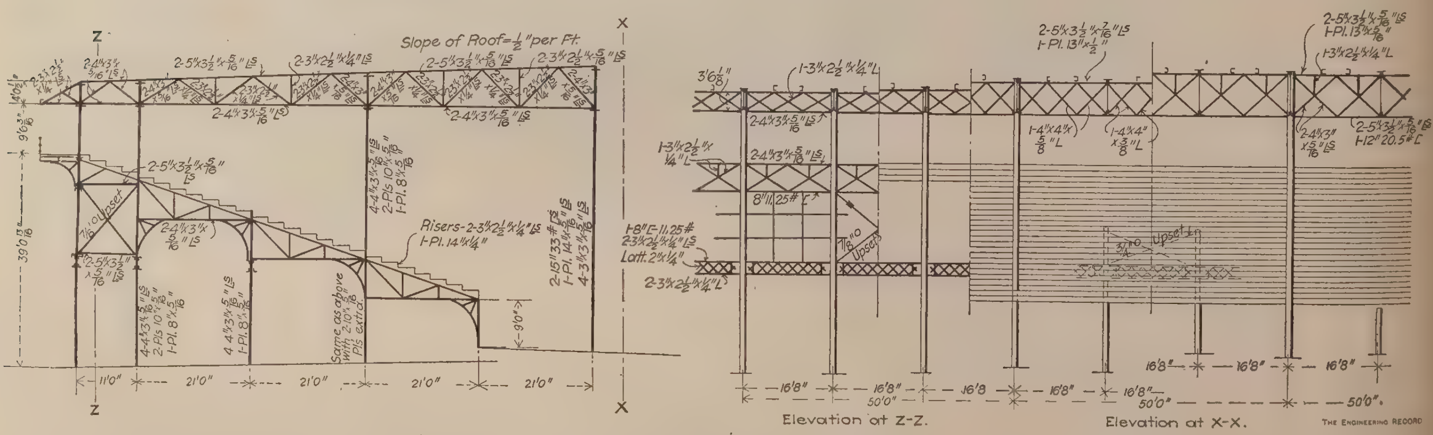
Grandstand Plans.



Grandstand Column.



Detail of Seat Construction.

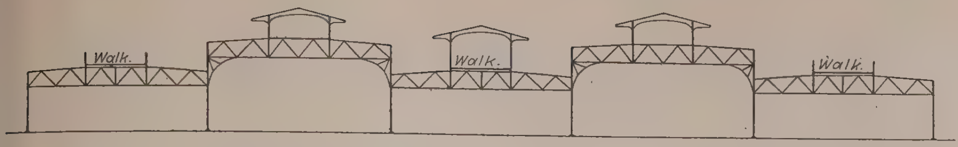


Cross Section and Part Longitudinal Elevations of the Field Stand.

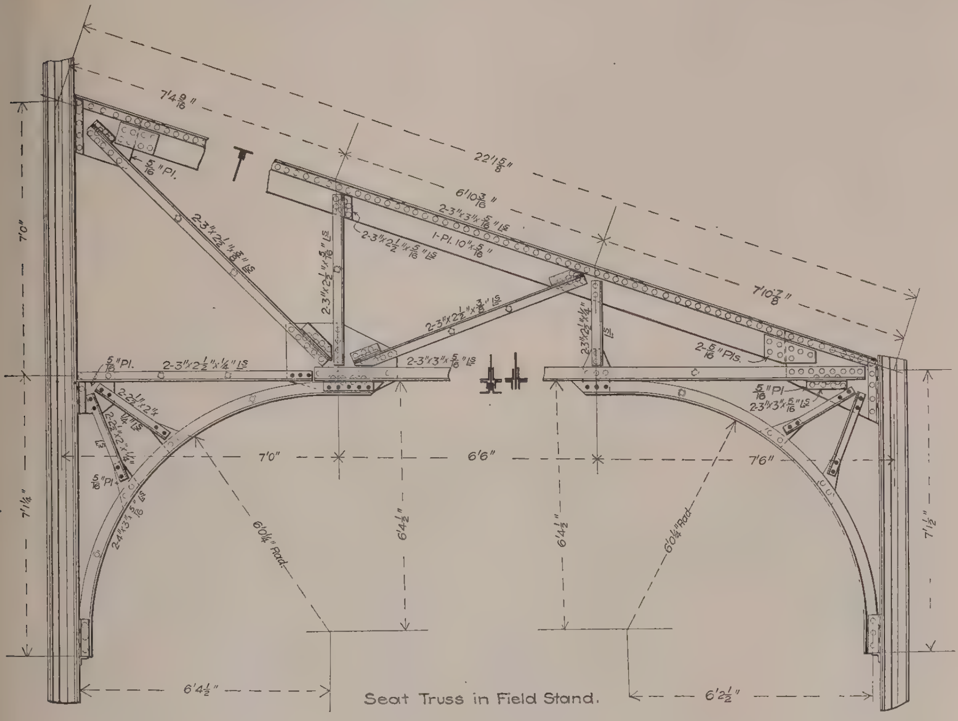
Steel Construction in Grandstand and Fieldstand.

longitudinal plate girders, 36-in. apart on centers which have Z-shape cross sections made with a 14x ¼-in. web and two 2½x2½-in. angles and secured to the top flanges of the transverse trusses with solid-web knee-brace brackets.

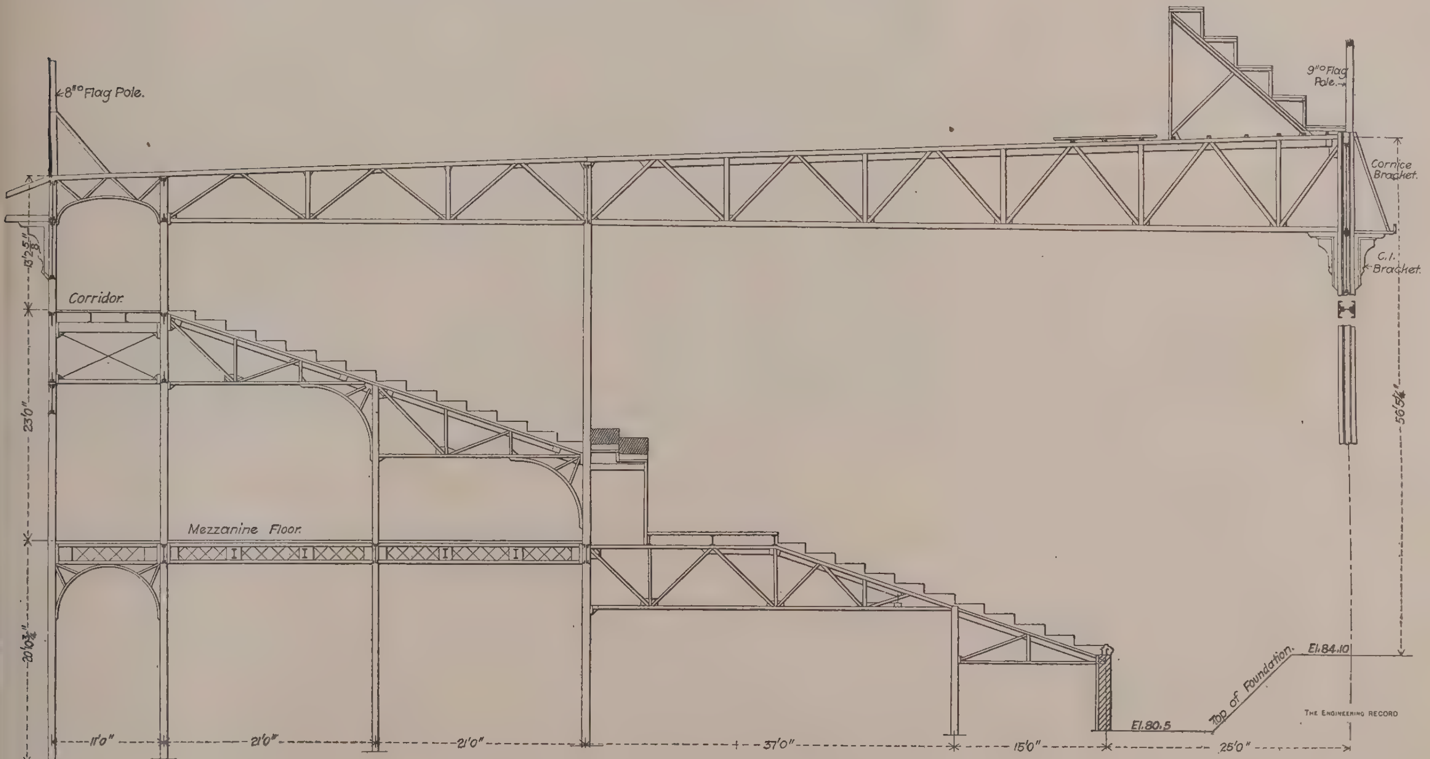
The longitudinal roof trusses are nearly 6 ft. deep over all, and are divided in three equal main panels by vertical members made with two pairs of angles, back to back, spaced far enough apart to receive between their outstanding flanges the field-riveted webs of the intermediate roof trusses. The top chord angles of the latter just clear above



General Section through Rotunda and Entrance to Grand Stand. THE ENGINEERING RECORD



Seat Truss in Field Stand. THE ENGINEERING RECORD



Typical Cross-Section through Grand Stand.

Principal Trusses in Grandstand, Fieldstand and Rotunda.

hose of the former, and are seated between pairs of transverse connection angles and field-riveted o their vertical flanges. The bottom flanges of the ntersecting trusses are nearly flush, and both are ield-riveted to connection plates on their horizonal flanges. Each main panel of the longitudinal russ is divided in three sub-panels by X-bracing of pairs of 4x3-in. angles back to back, riveted to pposite sides of the 14-in. web plates of the Thape chords.

The trusses are field-riveted to the columns through vertical flange connection angles at the ends of the web plates. A slightly different arrangement of the truss members is used in the center of the building, as indicated by the diagram of the front elevation. The other lines of longitudinal trusses correspond to those described except for the intermediate floor where there are simple lattice-girders 24 in. deep with pairs of 4x3-in. flange angles. Sway-bracing composed of ⅞-in. round upset diagonal rods with clevis ends and sleeve-nut adjustment is provided in every third panel between columns in the intermediate story, in the vertical longitudinal plane of the row next the rear wall. Similar horizontal bracing is provided in every third panel of the roof trusses in the planes of the top and bottom chords.

The columns in the front row support only the outer ends of the roof trusses, and have light rectangular cross sections made of two channels, latticed. The other main columns support the roof and part of the floor loads, and have I-shape cross sections as indicated in the views of the one of the center columns, with varying thicknesses of web and flange plates. They were riveted up complete in the shop and shipped in single pieces. The ⅞-in. base plates are extended to have bearing areas of 1,064 sq. in. on the piers, and are stiffened by wide gusset plates riveted across the flanges of the column. Four long 1½-in. anchor bolts are provided for each column to take up the tension stress from overturning moment due to maximum wind pressure. They have nut bearings on horizontal angles riveted to the bottom gusset plates with their outstanding flanges reinforced by the milled ends of vertical angles which distribute the stress. At the upper end the web plate is cut 5¾ in. shorter than the angles so that the latter project to form jaws between which is field-riveted a short wide plate receiving the field connections of the ends of the top chords angles of the transverse roof trusses. The latter have their bottom chords seated on shelf angles and are flange-riveted to the faces of the columns. All other beams, girders and trusses are field-riveted to the columns through end vertical angles.

The main entrance to the grandstand is over the flat roof of the one-story rotunda, 200 ft. long parallel with the axis of the grandstand and 250 ft. long in the direction transverse to it. At one end it adjoins the rear wall of the grandstand and at the other end has the corners rounded almost semicircular in plan. The sides are unenclosed, and the roof trusses are carried on six rows of columns transverse to the axis of the grandstand. The trusses are simple lattice girders with nearly horizontal top chords made with two flange angles and a vertical web plate. All the other truss members have T-shape cross sections made two angles, back to back. All the web members of the trusses are zig-zag diagonals except two verticals in each truss which receive the connections to the light longitudinal lattice girders. The transverse trusses are field-riveted to the column flanges through vertical connection flange angles on the gusset plates at the ends of their top and bottom chords. The trusses in the middle and outside spans have their lower chords at a clear height of about 12 ft. above the ground; the intermediate trusses are 8 ft. higher so as to provide clere-story spaces for ventilation and illumination between them. The roof is of 1⅜-in. planks on 3x6-in. purlins 4 ft. apart carried by the roof trusses and by two intermediate transverse lattice-girders in every 25-ft. panel which are supported by the longitudinal girders.

Wide sidewalks in the center of the middle and outside spans have a concrete floor on No. 20 galvanized corrugated iron, laid transversely on 6-in. longitudinal channels, 3 ft. apart. The two outer sidewalks are not covered, but that on the center trusses is provided with a canopy having a board roof supported on arched plate girders with very thin webs and light flange angles riveted to extensions of the center vertical members of the trusses. Similar canopies on the center lines of the two intermediate panels serve as monitors for those parts of the roof.

The 95x250-ft. field stand is similar in construction to the grandstand except that it has no intermediate story, and that the tier of seats is uninterrupted and has no horizontal platforms, but is reached only by stairs from the front or lower side. The space under the seats is used for barrooms, lunch rooms, toilet rooms, etc. The front wall is of brick, and the rear and side walls are of corrugated galvanized iron glazed. As in the grandstand, the framework is divided into 50-ft. panels by transverse rows of four main and two secondary columns, the former supporting the roof trusses and the seat girders, and the latter supporting the seat girders only, as shown in the sectional diagram. In each panel there are two intermediate roof trusses and two intermediate seat trusses; the former are carried by two lines of longitudinal trusses connected to the tops of the two front columns and by intermediate full-height columns in the two rear longitudinal rows. The latter columns also support the rear ends of the intermediate seat girders which have their middle and front supports on short columns independent of the roof columns. The lateral and sway bracing, and the character of the details, is essentially like that of the grandstand. The seat trusses are all made with deep curved knee-braces at the lower ends and the rear trusses have them at both ends to stiffen the columns against the bending moments from wind pressure and provide sway bracing.

The front longitudinal roof trusses are 7½-ft. deep, and are divided into three equal parts by vertical members composed of single pairs of angles, back to back, but staggered and spaced far enough apart to rivet on opposite sides of the truss connection plates and to receive between their other flanges the field connections of the intermediate transverse trusses. The top chord is made with two 5x3½-in. angles, back to back, with a full-length horizontal cover plate, and the bottom chord is made with a pair of 5x3½-in. angles, back to back, with their 5-in. horizontal flanges reinforced by a full-length 12-in. channel. The diagonals are pairs of 4x3-in. angles, back to back, riveted to opposite sides of the connection plates. The transverse roof trusses have all their members made with T-shape cross sections composed of two angles back to back, and are connected to the columns by their top chord angles engaging the extended web plates, which also serve as gusset plates for the trusses, and by pairs of vertical flange connection angles riveted to the gusset plates at the ends of the lower chords and field-riveted to the column flanges.

The framework of the grandstand and of the fieldstand was erected by a pair of duplicate travelers, each of which consisted of a 30x30-ft. wooden tower, 30 ft. high, mounted on four double-flange wheels on a 30-ft. gauge track and X-braced on all vertical faces and in the horizontal plane of the top and bottom. A pair of stiff-leg derricks with 5-ton booms, 40 ft. long, were mounted on top of each traveler and handled all the steel work. The fieldstand was erected in the manner described for the grandstand, and before the latter was erected. Spencer surfacer paint was used for the shop-coat, and after erection, all steel work was painted two coats with "Cerion" paint.

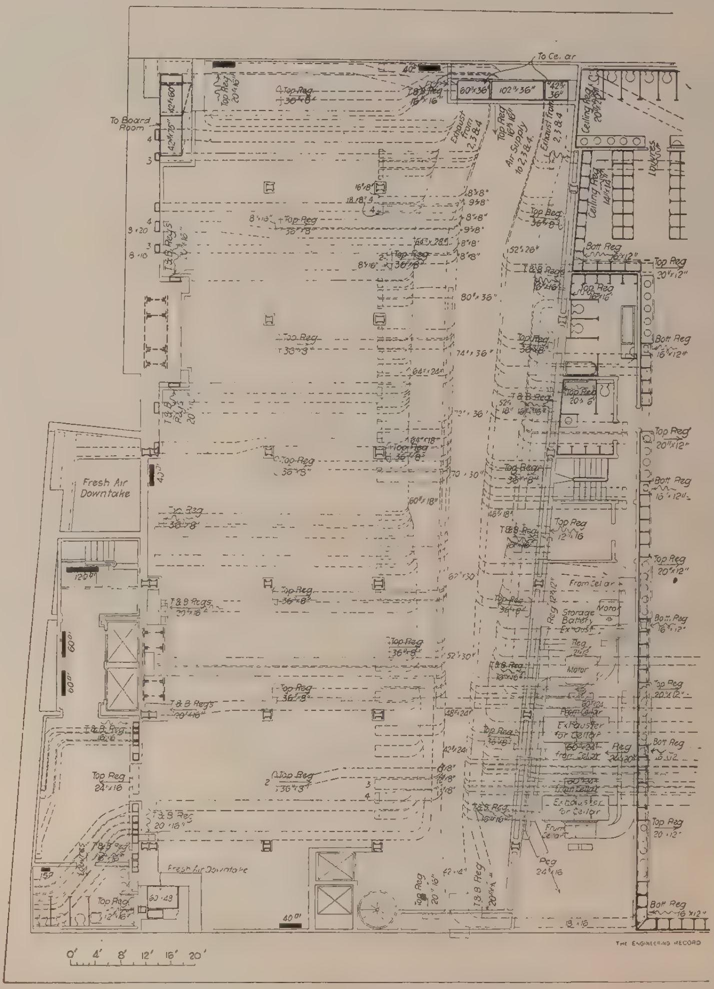
The engineering and architectural features and all buildings were planned by Mr. C. W. Leavitt, Jr., Engineer, who developed and directed all construction, and laid out the tracks and grounds. Mr. Mason R. Strong, M. Am. Soc. C. E., was called in consultation and for assistance on the structural steel. The contract for steel was awarded to the American Bridge Co., which executed the work under the direct supervision of Mr. J. H. Edwards, M. Am. Soc. C. E., assistant chief engineer in charge of building construction for that company.

The Manhattan Type of Engine, with vertical and horizontal cylinders, was forestalled by the engines built in 1869 by the Palmers Co., of Jarrow, England, for two ships of the Guion Line, according to Dr. A. W. B. Kennedy. These were compound engines, with the high-pressure cylinders placed vertically, and the low-pressure horizontally. They had Corliss valves worked by a wrist plate without trip-gear. Four sets of 5,000-h.p. engines, capable of 50 per cent. overload, are now being built for the London County Council. They have a similar arrangement of cylinders.

Heating, Ventilating and Air-Cooling at the New York Stock Exchange.—III.

The Ventilation in General.—The circulation of air through the building is maintained by eight centrifugal fans and three disk fans. For the rooms devoted to the transaction of business, the ventilating plant is designed to supply air under a slight plenum and also to exhaust it by mechanical means, the combined capacity of the exhausting apparatus for these rooms being somewhat less than that of the plenum apparatus. This is, of course, to provide that a positive outflow may take place from the spaces requiring ventilation without creating a tendency for an inflow of cold air through such openings as the building may possess.

For the purposes of convenience in operation, the ventilating plant is so divided that each part serves one of the portions of the building into which the latter is naturally divisible. The parts of the building thus independent so far as their ventilating equipment is concerned are as follows: The board room; the rented floors below the board room floor; the cellar, given over entirely to the mechanical plant; the board of governors' room, together with the rest of the rooms on the upper floors; and the kitchen in the attic.

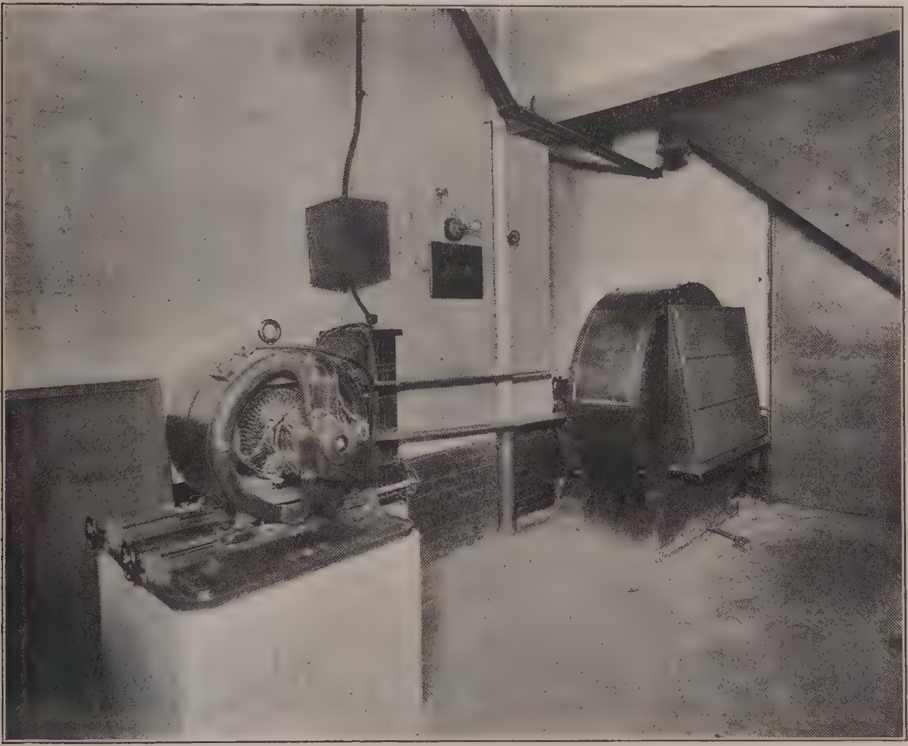


Ducts over Ceiling of Sub-Basement No. 2.

So far as possible the fan and heater units are placed in the cellar, and fresh air admitted through a large downtake dropping from the roof to the cellar. All the fresh-air fans, with the exception of a small disk fan for the kitchen, are located in the cellar, and they are distributed, so far as possible, in a line at the base of this air downtake. This made it necessary to provide long common air chamber from which all fans could draw, and allowed for a long air filter.

large enough to bring the velocity through the cheese-cloth to the specified ½ ft. per second. As shown in the cellar plan, there is a blower for the basement and sub-basements Nos. 1 and 2, a blower for the board room, a blower for the floors above the board room, and a blower for the cellar, all but the last having tempering coils on the suction side, between filter and blower.

The cellar is provided with exhaust ventilation and the exhausters are located in the sub-basement No. 2, no space being available in the cellar, and, moreover, ducts being conveniently carried upward to them. They are located in a room over the end of the boiler plant and discharge into a shaft near by. Two, mounted on the same shaft, were necessary, owing to the limited head room available. The exhaust from the floors lying between the cellar and the board room is carried downward to an exhauster in the cellar, which delivers, by means of the ducts shown, to a shaft alongside of that carrying the air from the cellar. The rest of the building from the board-room floor upward is exhausted by means of two large disk fans at the roof, a system of ducts in the attic conducting the air from vertical flues of this system to the exhaust air chamber containing the disk fans.


Exhauster for Cleaning Air Filter Frames.

The accompanying table gives the sizes of the fans, together with the heating surface installed in the shape of tempering coils, the horse-power of the motors by which the fans are driven and the speeds at which the fans will give the air delivery for which the plant was laid out. The blowers were built by the B. F. Sturtevant Co., the disk fans are of the Blackman type, furnished by Messrs. Howard & Morse, of New York, and the motors are of the C & C Electric Co.'s manufacture, wound for specially slow speed. The differences in the depths of the tempering coils will be noted. Sixteen pipes were provided in the coils for the board room, so that air in this case might, under severe conditions, be supplied at a temperature high enough to assist the direct radiation installed in that room with its great amount of glass surface. A similar reason explains the difference between the depth of the coils of the upper floors and of those under the board-room level.

Each of the tempering coils is controlled by a pair of thermostats, one fixed in the cold-air duct and controlling two sections first encountered by the incoming air and the other in the hot-air duct controlling the remaining sections of the tempering coil. Each section of each group is, of course, fitted with a hand valve.

Summary of Fans Installed in Building.

	Fan size.		Tempering coils.		Fan motor.	
	Dia. ft.	Width, ft.	Sq. ft.	Rows deep.	H.p.	R.p.m.
Fresh-air fans:						
Cellar system	8	5	....	..	15	160
Lower floors system	10	4.5	2,200	12	20	120
Board room floor	11	5	3,470	16	24	110
Upper floors system	10	4.5	2,500	14	20	120
Kitchen, (disk fan)	3	..	....	..	5	300
Exhaust-air fans:						
Cellar (2 fans)	7	4	....	..	28	180
Lower floor system	10	5	....	..	20	120
Board room and upper floors (2 fans)	8½	..	....	..	30	150
Filter cleaner	3	1.5	....	..	4	500
Storage battery exhaust, No. 10 Monogram fan.						

An interesting detail is the provision in each chamber of a moistening pan for maintaining the air, under automatic control of a humidostat, at the desired degree of humidity. Each pan, which is placed on the inside or warm side of the tempering coil, is of the same length as the tempering coil, and built of 24-oz. copper. It is furnished with submerged steam pipe coils to set up evaporation, and with an automatic water-feed valve for keeping the coils submerged. This type of moistening pan was installed in the heating plant of Mr. Andrew Carnegie's residence, described in The Engineering Record of Oct. 3, 1903. In this case, it will be recalled, an evaporation of 10.85 lb. of water was obtained per square foot of the steam pipe coil surface. The humidostat controls the steam coil supply by means of a diaphragm valve taking air from the temperature regulating system.

In general the ventilating system is designed to effect a desired number of air changes per hour, the figures for the average case being six changes for the fresh-air side and one less or five for the exhaust-air side. The excess is largely disposed of through the doors to toilet rooms, which are ventilated at the rate of fifteen changes per hour without special fresh-air supplies. There are a few special cases where an excess of exhaust over supply is provided, on account of the relatively high degree of vitiation or the presence of disagreeable odors. One of the locker rooms, for example, has five changes on the fresh-air side, and eight on the exhaust side; and several hat and coat rooms, four and eight changes, respectively.

The total quantities handled by both the fresh-air and exhaust systems are given in the accompanying table, from which it is seen that on the basis of the gross contents of the building ventilation is obtained in terms of five changes per hour. While the board-room system has its own fresh-air fan, the exhaust, as stated, is handled by the fans serving also the upper floors.

Table of Air Volumes by Floors.

	Contents, cu. ft.	Air supply, cu. ft. per min.	Exhaust, cu.ft.per min.
Cellar system	238,000	45,000	60,000
Lower stories:			
Sub-basement No. 2 ..	175,100	14,810	16,400
Sub-basement No. 1 ...	165,800	13,890	16,900
Basement	173,500	13,040	15,950
Board room floor	1,246,100	61,760	52,070
Upper floors:			
Mezzanine floors	174,600	10,120	11,570
Bond room floor	223,700	26,200	22,930
Club floor	183,600	13,650	15,060
Attic floor	120,600	1,840	13,660
Roof space	25,000	.....	.....
Total	2,706,000	200,310	224,540

The general features of the ventilating plant having been outlined, it will only be necessary to point out the special features of the different sections of the system. As regards the cold air supply, it may be pointed out that besides the large downtake, an additional source of supply was obtained by taking fresh air from Broad St., conducting this air to a short downtake 5x4 ft. in size, and connecting the bottom of this by an overhead duct in the cellar to the fresh-air chamber at the air filters. The cross-section area of the main downtake is about 150 sq. ft., and with all four fans in operation at the same time at full capacity, the velocity of the air in it would be approximately 20 ft. per second.

The air filters are of the usual cheese-cloth type, set in frames fixed in a zigzag fashion, with galvanized wire netting to support the cheese-cloth. The total area is about 5,400 sq. ft., so that on the basis of a total flow of 200,000 cu. ft. of air per minute, the velocity through it is 0.6 ft. per second. About fifty filter frames are taken out each day for cleaning, the reserved number in storage being equal to that in use, and this arrangement results in the entire filter being cleaned in a period of two weeks. Owing to the height of the filter and its unusual length, a permanent iron gallery has been built along it with steps to reach the gallery floor, so that the upper section of the filter screens may readily be handled.

For cleaning the filter sections, a special fan, noted in the table of fans, is installed in a room adjoining the cold-air chamber. To the suction side of this fan is built a special hopper inlet, which is large enough to receive one frame, and with the suction of the fan and the application of a broom, the particles of dust are loosened from the cheese-cloth and discharged finally out of doors.

The Cellar Ventilation.—The cellar blower does not, of course, handle tempered air, as the air supply is furnished as much for cooling purposes as it is for ventilation, and the fan is placed end on toward the cold-air chamber, and is of the double inlet type, as indicated in the cellar plan. The discharge from this blower is divided into two ducts running in opposite directions, one 54x31 in. in cross-section and the other 54x29 in. These ducts are carried around throughout the mechanical plant, and deliver mostly through openings in the bottom of the duct itself. It will be of interest to add that the total area of the registers of this system is 28.4 sq. ft. for the larger duct and 25.7 sq. ft. for the smaller duct.

By another system of ceiling ducts with register openings generally in the bottom of them, air is carried from the cellar to the pair of exhaust fans in sub-basement No. 2. These ducts all lead to four short uptakes connecting with the exhauster inlets, the exhausters being of the double-inlet type. They discharge downward into a duct in the upper part of the boiler room, and the two ducts from the two exhausters are there joined and continued into the main exhaust shaft.

There are four registers through which fresh cold air is delivered into the boiler room, these distributed along the inner side over the firing space, and the outflow is provided for through a register over each of the boiler settings toward the rear and also one over the feed-water heater. Here for a total area of fresh-air registers of 1,920 sq. in. there are 3,600 sq. in. of exhaust outlets. Besides providing for ventilation in the engine room, the ducts take also from the pipe space underneath that room.

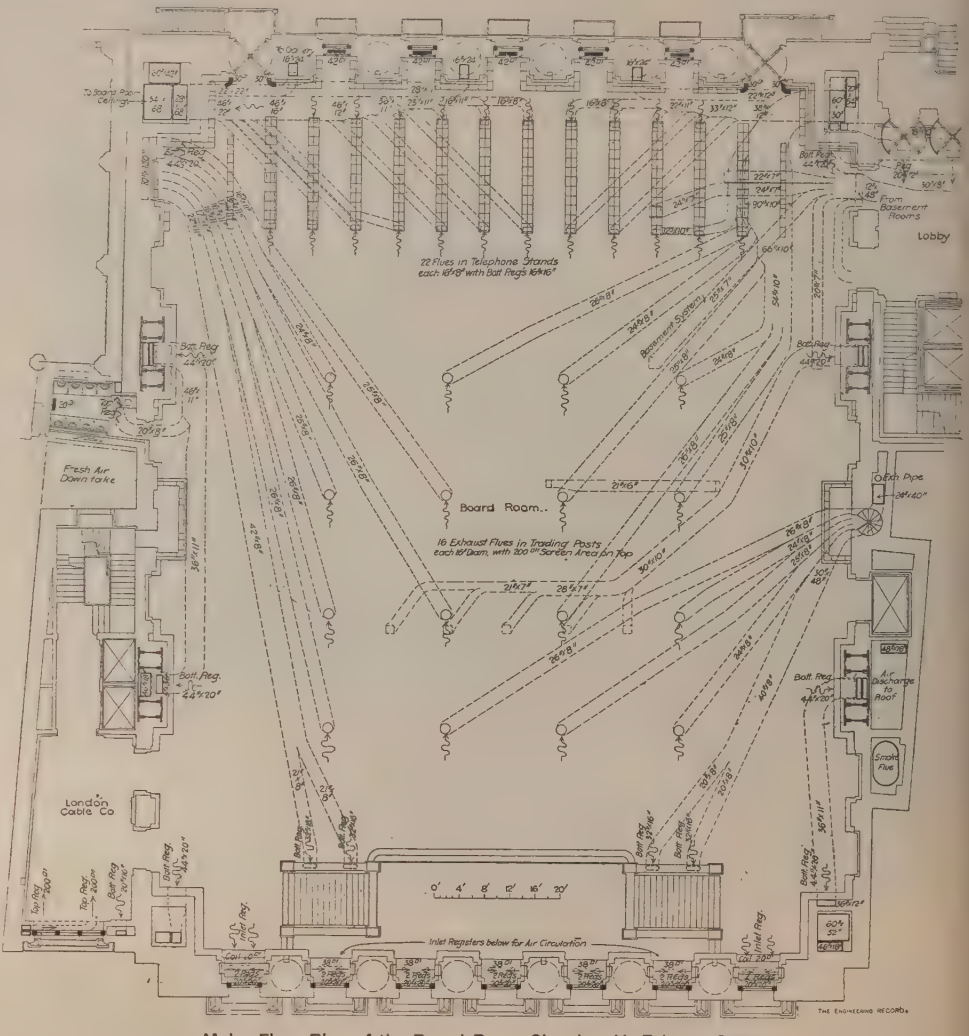
Ventilation of the Underground Rooms.—The blower for the floors between the cellar and the board room discharges most of its air through a short duct and flue carried to the level of the ceiling of sub-basement No. 2, where it is carried forward in a main duct over a suspended ceiling in that story. The air is then distributed by numerous branch ducts from this trunk duct to the individual flues. This system includes the basement, sub-basement No. 1 and sub-basement No. 2. The handling of the exhaust air is accomplished with a system similar to the fresh-air system, the flues from the vent registers dropping downward to the space provided above the false ceiling of sub-basement No. 2, and there connecting into a pair of main vent ducts. These deliver into large flues dropping to the cellar ceiling, where they are joined into the exhauster for these floors. This discharges into a duct 42 in. deep and 102 in. wide, which is carried from this point against the cellar ceiling to the main air discharge shaft, which, as stated, also receives the air from the pair of exhausters for the cellar.

Ventilation of the Board Room.—The board room is ventilated on the downward system, and an elaborate arrangement of ducts has been provided by which the air can be admitted at a large number of points spread over the entire area of the board-room ceiling. The air is delivered to this distributing system at two diagonally opposite points, and one of the cellar ducts from the double-discharge board-room blower connects into a 60x58-in. vertical flue rising from the cellar to the ceiling level of the board room at one corner, and the other cellar duct terminates into a 60x52-in. flue, which rises at the diagonally opposite corner.

The system of distribution is briefly this: The decorative ceiling, through the inconspicuous openings of which the air is admitted into the room, is divided naturally into six transverse lines, and in each of these are spaced a number of galvanized-iron boxes, each receiving air through a branch duct and delivering it through the ceiling openings which each box groups together. At opposite ends of each pair of these six lines of boxes is a similar box considerably longer, however. The boxes may be regarded as forming three rectangles; one rectangle and the half of the middle one is supplied from one of the main fresh air flues from the cellar, and the third rectangle and the remaining portions of the middle rectangle from the other fresh-air flue.

The boxes are all 24x10 in. in cross-section. Those in the six transverse lines, with seven boxes in each line, are 120 in. in length. The end boxes of one of the rectangles are 300 in. long, those of the center rectangle are 444 in. long and those of the third rectangle, 312 in. Each of the smaller size boxes is supplied from the distributing ducts above the board-room ceiling by a single branch duct, while the longer boxes are supplied by three branch ducts.

The interesting point is the provision made in the proportions of the entire system for equalizing the resultant pressure in all of the boxes, so that there will be an equal distribution of air over the entire ceiling. All other dimensions being equal, the discharge of air through the boxes is proportional to their length. It will be found that there are 3,324 lin. ft. of boxing connected to the northeast flue, which is the one 60x52 in. in cross-section, while a greater number, 3,828 ft., are served by the southwest shaft with a cross-section area not proportionately as large. While the reference to the matter in the following terms is not to be taken as an explanation of the method by which the design was developed, the analysis may be regarded as an approximate check to substantiate the dimensions chosen.



Main Floor Plan of the Board Room Showing Air Exhaust System.

The southwest flue, on the given assumption of delivery proportional to the linear feet of the box work, carries thereby 15 per cent. more air than the northeast flue, but has a cellar duct that is but 3 per cent. larger than the northeast duct. This makes the relative velocities for the southwest and northeast ducts, 1.115 and 1, respectively. The length of the southwest duct, however, which is not shown at all on the cellar plan, is, including horizontal parts, 90 ft., while that of the northeast duct is 100 ft. As the loss of pressure in ducts is proportional both to the length of the duct and to the square of the velocity, and therefore to the product of the length and the square of the velocity, the relative loss of pressure in the southwest and the northeast ducts is $1.115 \times 1.115 \times 90 = 112.5$ and $1 \times 1 \times 100 = 100$, respectively.

For the flues themselves, the figures check up as follows: The southwest flue through the lower part, or 45 ft., of the building is 60x58 in. in size, and through the remainder of the distance, about 80 ft., is 54x68 in. It will be found that its relative velocity, as compared with the northeast flue, is 1.03 through the 45 ft. and 0.98 through the 80 ft. The relative pressure loss through the 45 ft. is accordingly 47.7, and through the 80 ft., 76.8, making a total for the 125 ft. of 124.5 as compared with 125 for the 125 ft. of the northeast flue.

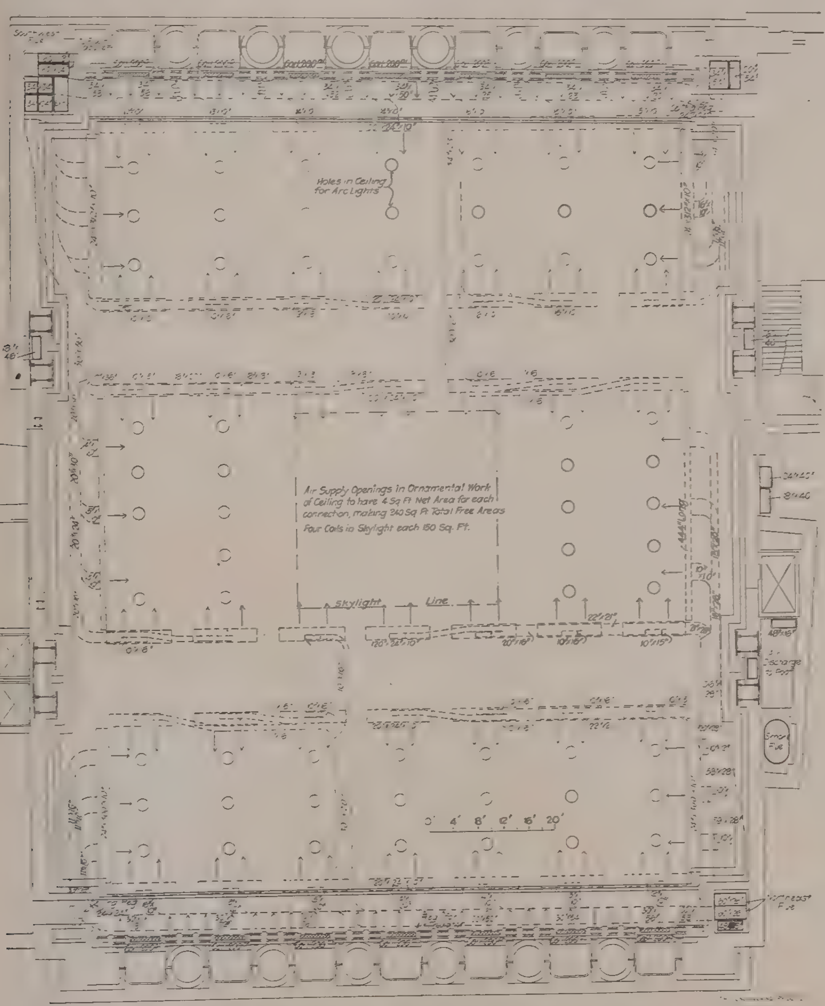
The delivery of the northeast flue, as determined by the proportionate length of box work is 28,000 cu. ft. of air per minute, making the duct and flue velocities, 1,575 and 1,300 ft. per minute, respectively. The delivery of the southwest flue is 32,000 cu. ft., and the duct and flue velocities figure out at 1,750 ft. and 1,250 ft., respectively. By successively reducing the velocity in the system of distributing ducts above the board room ceiling, it is calculated to equalize the pressure at the delivery end of the branch ducts into each box. This provision for velocity reduction is indicated in the proportions of the small branches themselves, varying from 10x12 in., in the case of the branch nearest the flue, to 11x16 in. in the branches most distant.

The air is drawn from the board room near the floor line through register openings in the sixteen trading posts distributed over the floor, through registers at the bottom of each line of telephone stands, 23 registers altogether, through four large bottom registers in the four corners of the room, each 44x20 in. in area, and through four similar size registers in the inside walls and four 32x16-in. registers near the Broad St. wall, at the opposite end of the room from the telephones. These all connect into ducts over the basement ceiling, which lead, as shown, to a few large-size flues; and the latter are carried vertically upward to the attic space, where they are joined together and led to a central point to the chamber with the two Blackman fans.

The registers at the trading posts consist of a 200-sq. in. circular screen at the top, with a 16-in. flue connecting into the horizontal duct under the floor. The cross-section area of the vent registers distributed along the Broad St. front amounts to 26.7 sq. ft.; the cross-section area of the vent registers serving the opposite end, along New St., amounts to 51.3 sq. ft.; the combined cross-section of the screens conducting the air from the trading posts is 22.2 sq. ft.; the area of the registers in the south wall, 12.2 sq. ft., and the area of the registers in the north wall, 12.2 sq. ft.

The blower serving this room is calculated on the basis of 60,000 cu. ft. of air per minute, which is equivalent to three changes of air per hour, the volume of the room being about 1,200,000 cu. ft. As the calculations are also based on an occupancy of 1,000 persons, it will be noted that 3,600 cu. ft. of air can be admitted per capita per hour. There are 1,200 cu. ft. of space in the room per person, so that more than sufficient air is delivered for continuous occupancy on the basis of each person giving off 0.6 cu. ft. of carbonic acid gas per hour, and allowing 6 parts of carbonic acid gas in 10,000 parts of the air. A calculation shows that the supply is sufficient for continuous occupation if each of the 1,000 persons is charged with 0.72 cu. ft. of carbonic acid gas per hour, which is the amount given off by males during repose, according to some authorities.

The Upper Floors.—The system above the board room includes some interesting cases of ventilation, namely, the bond or board of governors' room, and the club dining room on the clubroom floor. The air is delivered from the cellar fan serving this system through a number of large flues and the distribution is effected by ducts hidden above suspended ceilings. The exhaust outlets lead to flues, which, together with those from the board room, terminate in the attic roof space, where they are joined to the fan room already referred to. The fan room is some 16 ft. wide and 31 ft. long. The fans are each set in a transverse partition in the room forming a common discharge chamber, which is open to the atmosphere through a 10x10-ft. discharge covered with a copper cap.


Holes in Ceiling for Arc Lights
Air Supply Openings in Ornamental Work of Ceiling to have 4 Sq Ft Net Area for each connection, making 240 Sq Ft Total Free Areas
Four Coils in Skylight each 150 Sq. Ft.
Skylight Line
0' 4' 8' 12' 16' 20'

Gallery Plan of the Board Room Showing Air Supply System.

The club dining-room on the floor above the bond-room floor is 39½x68 ft. in plan with a 9x16-ft. alcove containing a large fireplace, and is 18 ft. 2 in. in inside height. Here fresh air is delivered through five openings, in the ornamental cornice work in the inside wall, while the exhaust is withdrawn through top and bottom openings in both the outside and the inside walls, the exhaust openings in the latter being located midway between the inlet openings. The five inlet openings are located above each of the five doors in the inside wall, and each has a net area of 300 in. The fresh-air duct to them is run from a flue in the adjacent corner of the building above a suspended ceiling.

The fresh-air supply is calculated on six changes per hour, and the corresponding volume of air, 5,250 cu. ft. per minute, shows that the velocity at entrance is about 8.4 ft. per second. This relatively high velocity is designed to obtain a discharge along the ceiling as far as possible toward the outside wall, so as to secure a satisfactory distribution and circulation within the room. Of the eight pairs of exhaust outlets, four in each long wall, the lower ones in each case have 36x8-in. registers and the upper ones have an equivalent area in the ornamentation of the cornice. Air is also withdrawn from the dining room through the louvers in the doors to two closets at one end of the room, each closet having a 12x12-in. register. With the five changes an hour provided by the exhaust system, the average velocity is less than 2¼ ft. per second, both bottom and top vent registers being open.

The supply of air to the kitchen in the attic consists in the delivery of air through ten spouts dropped through the kitchen ceiling along the hood over the kitchen range. The air is taken from above the roof or from the room by the disk fan noted in the table and the ducts are run in the roof space, with branch circular downtakes to the 10-in. discharges at the range hood. These branches are varied in size by half inches from two 8 in. in diameter nearest the fan to two 10 in. in diameter farthest from it. The downtakes are spaced on 4 ft. centers and their discharge openings are about 6 ft. above the floor. The duct from fan to last outlet is not more than 45 ft. long. Corresponding with each air inlet is an exhaust opening in the underside of the kitchen hood. These are connected by a duct to the main exhaust chamber. Their total area is about double that of the inlets.

A Refinement in Machine Tool Manufacturing.

An example of the refinements toward which the manufacture of modern machine tools is tending is to be noted in the methods of testing the frames of iron planers by the Pond Machine Tool Co., Plainfield, N. J. It is essential in making a planer frame for accurate work that the side-frames or housings, on which the cross-rail, with its cutting tool heads, has its vertical adjustment, shall, when erected, come in perfect alignment with each other, and also have their edges absolutely at right-angles with the table of the planer on which the work is carried. Every completed pair of planer side-frames is mounted in a test-block of great accuracy of construction, which supports them in the same relative position they will occupy when erected on a planer bed. The sides of this test-block have been very carefully scraped and fitted for supporting the frames in parallel position, and provisions are made for quickly clamping them rigidly into position for testing.

The testing is done with a micrometer gauge carried on a long and rigid arm, pivoted to swing in an absolutely vertical plane, and measuring the distances from this true vertical plane to all points of the front faces of the side frames. These faces must all be parallel to the vertical plane, and a variation of more than 0.002 in. from the true vertical in either side frame is considered at the Pond works to require refitting it on its base in order to bring its face vertical. With the faces of these side frames adjusted vertically within this limit of accuracy, practically perfect work is insured, as the cross-rail and side-cutting tools will then be fed upward or downward in a plane at right-angles to the planer table. Similar precautions are taken in the fitting and adjustment of the cross-rail and other tool-carrying parts.

The Uganda Ry. was operated at a loss of £10,000 last year, exclusive of the loss of £50,000 interest charges. The steamers on the lake more than pay running expenses.

The Mosman Septic Tanks, Sydney, N. S. W.

Four septic tanks, a grit chamber, eight filter beds and two gear chambers have recently been completed for the Mosman district of the Sydney sewerage system. The works were constructed under the direction of Mr. L. A. B. Wade, from whose official report concerning them, the following notes have been taken:

The site is protected from the action of the waves, which at times is considerable, by means of a wall of solid sandstone ashlar masonry 3 ft. thick and 9 ft. high. The works are designed to serve a population of 3,500, the maximum flow of sewage and rain water provided for being 50 imp. gal. per person per diem. The main 16-in. sewer discharges first into the grit chamber, which is 7x4x5 ft. deep. From this chamber a 24-in. pipe leads the sewage into the tanks by means of a specially constructed 9-in. junction leading into a small chamber, which is provided with a stop-board made in two pieces, the sewage flowing under one piece and over the other, and which can also be made to direct the sewage into any tank, or into any number of tanks, at the same time. Leading away from the grit chamber is also an overflow 16 in. in diameter, which is intended to come into action should the flow of sewage at any time exceed the maximum for which the works are designed. As a precaution, the overflow is marked by a dripping slab, arranged to prevent the escape of any floating solids, all of which will pass into the tanks. The tanks are 68 ft. 6 in. x 28 ft. 6 in. x 6 ft. deep, and they have a gross capacity of 290,370 imp. gal. They are roofed with tiles, under which is a covering of half-ply ruberoid over 4x½-in. tongued and grooved kauri lining; the lining and the inside timbers of the roof are covered with two coats of kerosene tar. Access is gained by means of three doorways, and a small inspection opening is provided on each gable end. The doorways and the openings are sealed with sugar-pine doors fastened with dog-bolts, and they shut against a layer of felt ¼ inch thick.

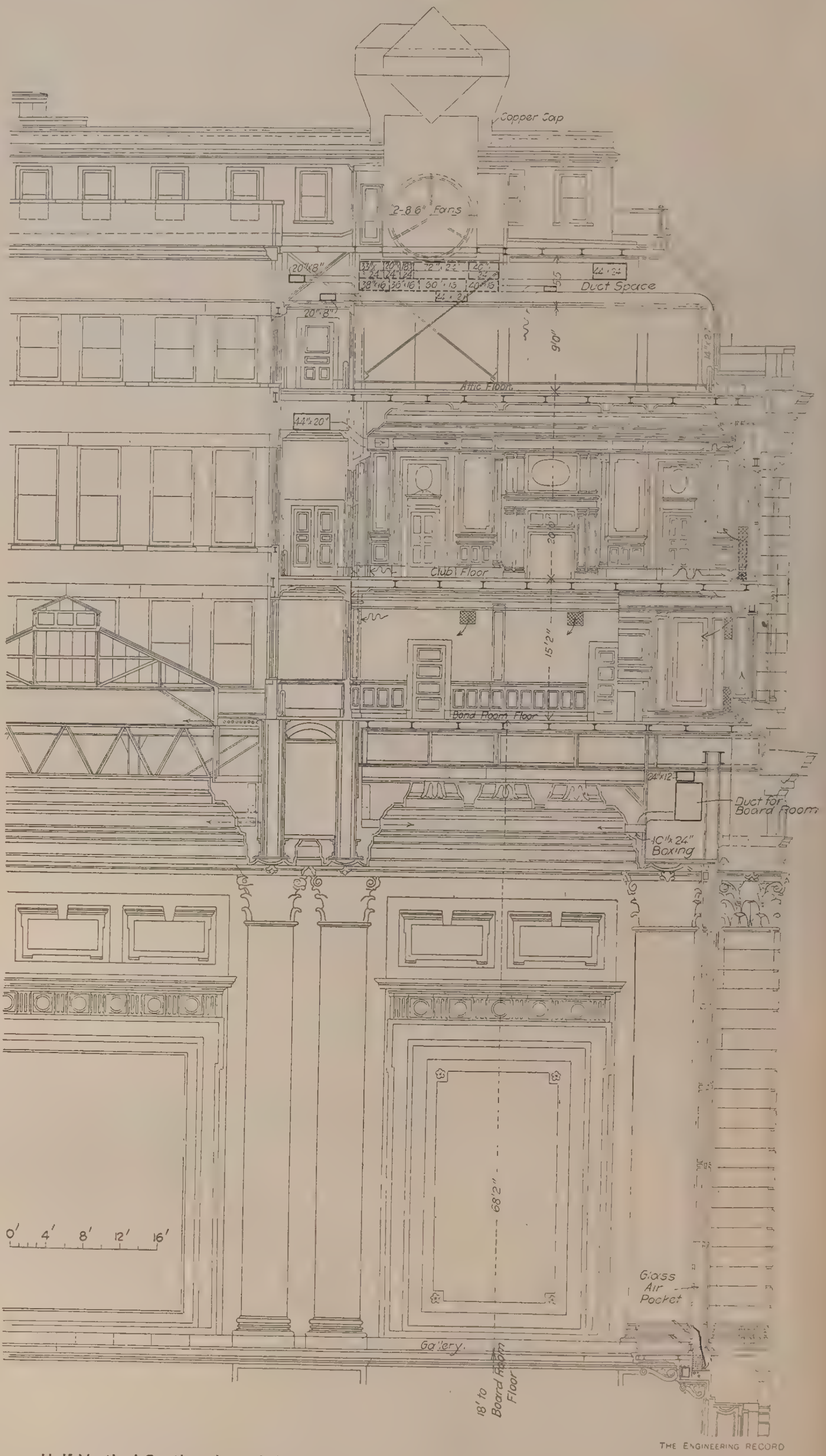
After the organic matter in the sewage has been acted upon by the liquefying micro-organisms, by which it is broken down into substances capable of being dealt with by filtration, the tank effluent thus freed from solids passes under tarred hardwood baffle-boards and onwards through four openings which are provided with stop-boards, and into the effluent channel. This channel connects with all of the tanks, which can be worked separately by means of the stop-boards and the effluent conducted on to any filter bed. The tanks are also ventilated, and special means are provided for taking the accumulated gases out of the roof into the shaft leading to the ventilation tower.

Any material detritus which may escape from the grit-chamber, together with any insoluble residue from the sewage solids, will accumulate slowly in the tanks. This residue will not require to be removed for a considerable period.

The tanks are connected with a rock-faced sandstone ventilating tower, 50 ft. high, erected on the southern side of this site, with its base 30 ft. above the tanks. Between the tanks and the tower is a cutting in the face of the cliff, built up with rubble masonry, forming a shaft in which is built a baffler, and communication to which is obtained by means of a small door for the purpose of testing the volume of air passing through.

The effluent channel from the tanks discharges direct into the automatic gear by means of 12-in. pipes. This automatic alternating hydraulic machinery, which was supplied by the Septic Tank Syndicate, is erected in gear-chambers, 15 ft. x 4 ft. 6 in., roofed with tiles, and ventilated by means of wooden louvres in each gable end, with doors on either side for access.

The alternating machinery fills and empties the filters automatically. There is one set of gear for each filter. The lever from which the admission valve and the discharge valve are suspended is attached to an actuating bucket at one end and a counter-weight at the other end. As soon as the filter is full, a small quantity of filtered effluent will overflow into the actuating buckets, thereby closing the admission valve, and remaining until the next tank is filled, when the discharge valve is opened. The discharge of the filter will bring about the emptying of the actuating bucket of the next filter by means of a syphon; the counter-weight will then come into play, by closing the discharge valve and opening the admission valve. In order that this cycle may go on continuously, the overflow pipes from all the filters are joined into a continuous connection of 2-in. galvanized iron piping around the bottom of the gear-chamber, and having a four-way cock placed at every junction with the overflow. The cutting-out or throwing-in of a given filter is effected by merely giving either cock a quarter turn. The whole of the alternating gear cost £596.



Half Vertical Section through Building above Board Room Floor, New York Stock Exchange.

The contact filters are 68 ft. x 32 ft. x 5 ft. deep, having a superficial area of 17,408 sq. ft. The filtering material is 4 ft. deep, having 6 in. of

¾-in. gauge bluestone screenings on the top of the filtering material. In the bottom of each filter are two lines of 6-in. perforated pipes laid longitudinally, and three lines of 4-in. perforated transverse pipe, which lead into one longitudinal flagged drain, 15 x 8½ in., and one cross-flagged drain, 9 x 6 in. These pipes and drains are covered first with sandstone metal broken to a 2½-in. gauge to a depth of 6 in. At the end of the drains cleaning chambers are built.

The filtering material consists of ⅝-in. coke breeze having voids of 51.4 per cent.; coke, with voids of 50 per cent.; and destructor clinker, with voids of 53 per cent.; the metal screenings have voids of 50 per cent. The sewage from the alternating gear is distributed over the surface of the filters by means of four longitudinal lines of 6-in. half drain-pipes, and gradually fills the filters by means of downward filtration.

Four filters in each set come into operation alternately. On the opening of the discharge valve in the gear-chamber the filtered effluent will escape, drawing down after it a supply of air into every crevice of the filter; the filter will then drain and aerate, while the remaining filters of the set are filling. The discharge from the filters runs direct from the alternating gear into the outlet pipes, and where the junction is effected a chamber is built for the purposes of cleaning and attention. In this chamber also is fixed a cast-iron inspection eye, with a blank flange bolted on with muntz-metal nuts. This eye is placed at the end of the cross-flagged drain in the bottom of the filters. The flange can, therefore, be removed and the drain cleaned during the progress of the filtration and without stopping the continuous action of the filters.

The works required 12,000 cu. yd. of concrete and 2,041 cu. yd. of filling material for the filters. They were built by day labor and the expense in connection with the tanks alone was over £13,000.

Interior of the Board Room, New York Stock Exchange.

Simple Mechanical Filters.

Simple mechanical filters are employed in the plant of the Rochester & Lake Ontario Water Co. The water passes through 3 ft. of sand into perforated brass pipes connected with a center manifold having a branch bolted to the bottom of the filter shell. The sand is of a size designated in the trade as between 14 and 20, and is very uniform. The perforated pipes rest on a level bed of concrete. No agitating devices are used, the washing being done by simple reversal of current. There is no sedimentation basin, and the coagulant, sulphate of alumina, is fed into the 24-in. suction pipe of the pumping station several hundred feet from the suction well. This type of plant is believed by the builders, the American Pipe Mfg. Co., Philadelphia, to give results about as good for ordinary cases as can be obtained with any other.

The New Works of the Ingersoll-Sergeant Drill Co.—II.

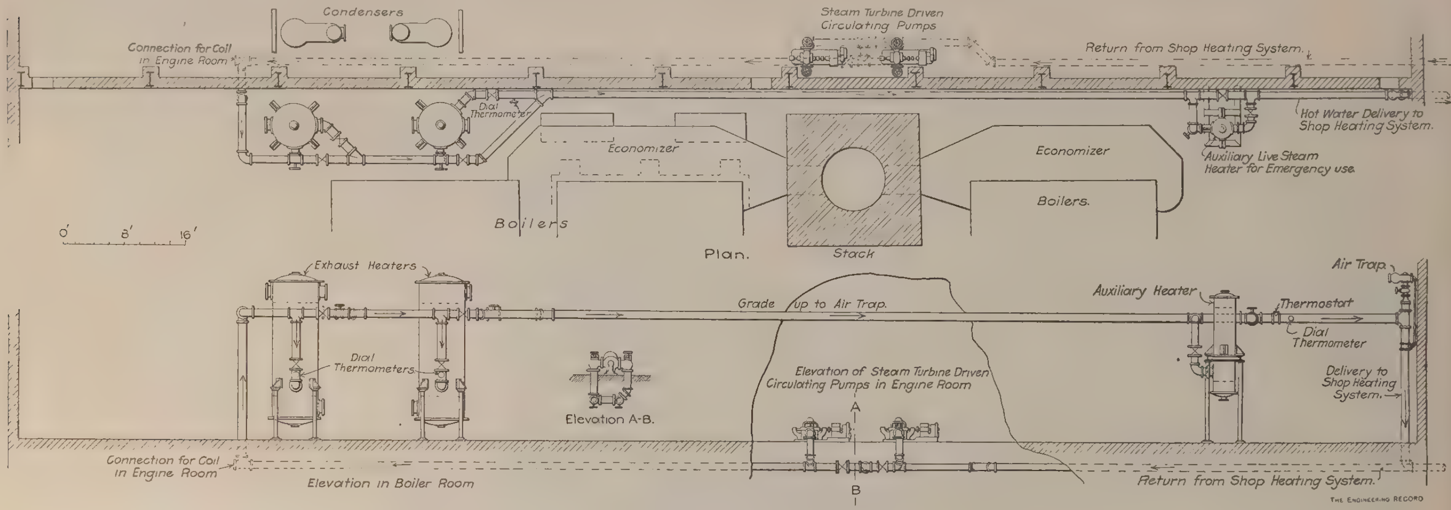
Power Station.—In this plant the power generation problem proved to be of considerable magnitude. Not only is electrical power to be used largely, but also compressed air is utilized to such an extent in manufacturing as to require the operation of two large air compressors. It was decided to provide a large power station centrally located with reference to the various buildings to which the power was to be transmitted through subways. The power plant is, as indicated in the layout plan of these works printed last week, located between the compressor erecting shop and the blacksmith shop, where the track connections are convenient for the handling of the coal supply and the subway system for pipes and cables could be most conveniently cared for.

The brick and steel building has the usual arrangement of parallel engine and boiler rooms, which is found not only convenient in operation but also favors extensions without alteration of the present plan. The engine and boiler rooms are 52 and 48 ft. wide, respectively, and both are 190 ft. long. The roof trusses are 30 ft. above the floor. In the boiler rooms the span of the trusses is considerably shortened by the arrangement of the coal hoppers and the monitor for the conveyor system. The elevated section has a clear height from floor to eaves of 49 ft. A light structure is also provided outside one end of the boiler room for the storage of ashes; this hopper arrangement is illustrated in a part exterior elevation of boiler room at one end.

Boiler Room.—The boiler room is laid out for five batteries of two boilers each, so as to provide an eventual capacity of 2,500 b.h.p.; at present, however, only three batteries are installed, each comprising two 250-h.p. Stirling water-tube boilers; the batteries at each end of the room are at present left vacant, although it is intended to install an additional battery in the near future. The chimney, which is a 200-ft. Custodis stack, rated at 2,500 h.p., is located approximately in the center of the building; the foundation is octagonal, 17 ft. in diameter, while the inside diameter of the flue is 8 ft. 6 in. The elevated coal storage consists of a system of hoppers of the Berquist suspension type, providing a total capacity of 1,300 tons. The hoppers have a total width at the top of 24 ft. and a depth of 14 ft., the full load capacity amounting to 7.56 tons per running foot. The coal hoppers are located over the boiler fronts, and are arranged to discharge directly through spouts into the hoppers of the stokers.

A convenient method of measuring the coal is used in this connection in that the delivery chutes have a measured capacity, and shut-off valves are provided at both ends; thus a single filling of each chute delivers a definite amount (about 450 lb.) of coal. In this way the coal consumption is accurately recorded by merely counting the chutefulls of coal delivered to the stokers. The coal is elevated from the receiving hopper and crusher in the basement up to the bunkers by a McCaslin self-dumping bucket conveyor, arranged to handle either coal or ashes. The ashes are received on the conveyor in the basement, and are dumped through a special chute at the top to the outside elevated hopper. The conveyor is operated by a motor in the basement, and geared to drive the buckets at 40 ft. per minute.

The boilers have Roney stokers arranged for the burning of anthracite slack, which is successfully accomplished by mixing with it a small proportion of bituminous slack in the proportion of about one to six. The further equipment of the boiler room consists of a Green economizer at either side of the stack, one to provide for two batteries and the other eventually for three batteries. The feed-water is heated in a 2,000-h.p. Cochrane heater supplied by the Harrison Safety Boiler Works; in accordance with the usual construction of these heaters, an oil separator forms the exhaust steam inlet into the heater and the feed-water is delivered free from oil. The two Cameron feed pumps are of the outside-packed plunger type, and each is rated with a capacity of 1,000 b.h.p. There is also a 1,000-gal. Worthington underwriters' pump and a 300-gal. Dean drip pump, which is also piped for emergency use in other connections.


Condensers
Steam Turbine Driven Circulating Pumps
Connection for Coil in Engine Room
Return from Shop Heating System.
Dial Thermometer
Hot Water Delivery to Shop Heating System.
Auxiliary Live Steam Heater for Emergency use.
Economizer
Economizer
Boilers.
Boilers
0' 8' 16'
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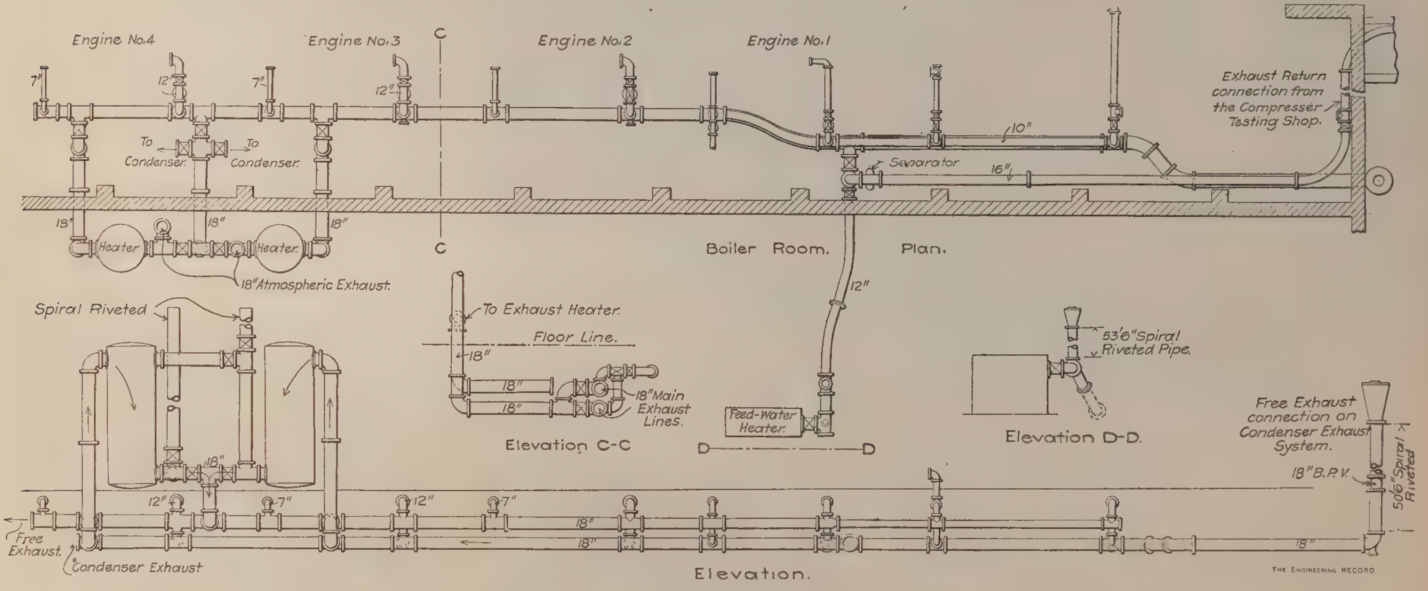
Exhaust Heaters
Air Trap
Auxiliary Heater
Thermostat
Grade up to Air Trap.
Dial Thermometer
Dial Thermometers
Elevation of Steam Turbine Driven Circulating Pumps in Engine Room
Elevation A-B.
Delivery to Shop Heating System.
A
B
Connection for Coil in Engine Room
Elevation in Boiler Room
Return from Shop Heating System.
The Engineering Record

Plan and Elevation of Piping in the Power Plant for the Hot-Water Shop Heating System.



Plan and Elevation of Exhaust Piping Systems and the Connections to the Condensers and Hot-Water Heaters.

The boiler feed piping is arranged in duplicate lines, one under the boiler room floor direct from the Cochrane heater, and the other overhead leading directly from the economizers. These two are interconnected to the boiler feed connections at the rear steam drum. The feed pump connections are flexibly arranged with reference to the two delivery lines, and may operate through either one, or by-pass them, if desired. Special attention was given to this feature of the boiler room equipment.

The main and auxiliary headers of the steam piping are located in a section of the boiler room basement at the rear of the boilers, which is covered by removable sections of iron grating; from there the connections to the engines are made through the wall into the engine-room basement. Each boiler is connected to the steam header through an automatic, non-return angle valve, and a 6-in. steam line with easy bends; at the junction with the header, there is an additional gate valve so that each boiler connection feeds through two separate gate valves. The steam header is 14 in. in diameter, so as to furnish a considerable reservoir capacity, and is supplemented by a 6-in. auxiliary header at one side. The two mains are interconnected, and the main header is sectioned by gate valves, so that if any section becomes disabled it can be by-passed by the auxiliary. The piping system was installed by Evans, Almirall & Co., using Walworth joints in all pipes above 5 in. Water of condensation is cared for by drip pockets beneath the header at various points, and by Cochrane steam separators at each engine connection. The drip system is operated by an improved high-pressure return trap system which feeds back directly to the boilers.

Engine Room.—The engine-room equipment consists of three 300-kw. Crocker-Wheeler direct-current generators, each driven by 450-h.p. Cooper-Corliss cross-compound engines; a 100-kw. generator of similar type, driven by a 150-hp. engine; an Ingersoll-Sergeant-Corliss cross-compound condensing steam-driven two-stage air compressor; and a smaller Ingersoll-Sergeant class "H" cross-compound condensing steam-driven duplex air compressor. The 450-h.p. engines driving the generators have cylinders 14¼ and 36 in. in diameter by 36 in. stroke, while the 150-h.p. engine has 9 and 22-in. cylinders and 30-in. stroke. The unusual cylinder ratio of 1:5.9 is used in these cases. The generators operate in multiple, delivering current upon the two-wire system at 240 volts.

The high-pressure air compressor has 12x28x42-in. engine cylinders, while the air cylinders have diameters of 14¼ and 22¼ in. This compressor has an intercooler and after cooler and the air cylinders are equipped with the air-operated inlet and discharge valves of the new type recently designed by the Ingersoll-Sergeant Drill Co. In the engine room are also located two 50-h.p. De Laval steam turbine-driven two-stage centrifugal pumps, which operate the hot-water shop heating system. They are supplied with steam through special piping from one of the boilers, which is equipped with a Foster superheater.

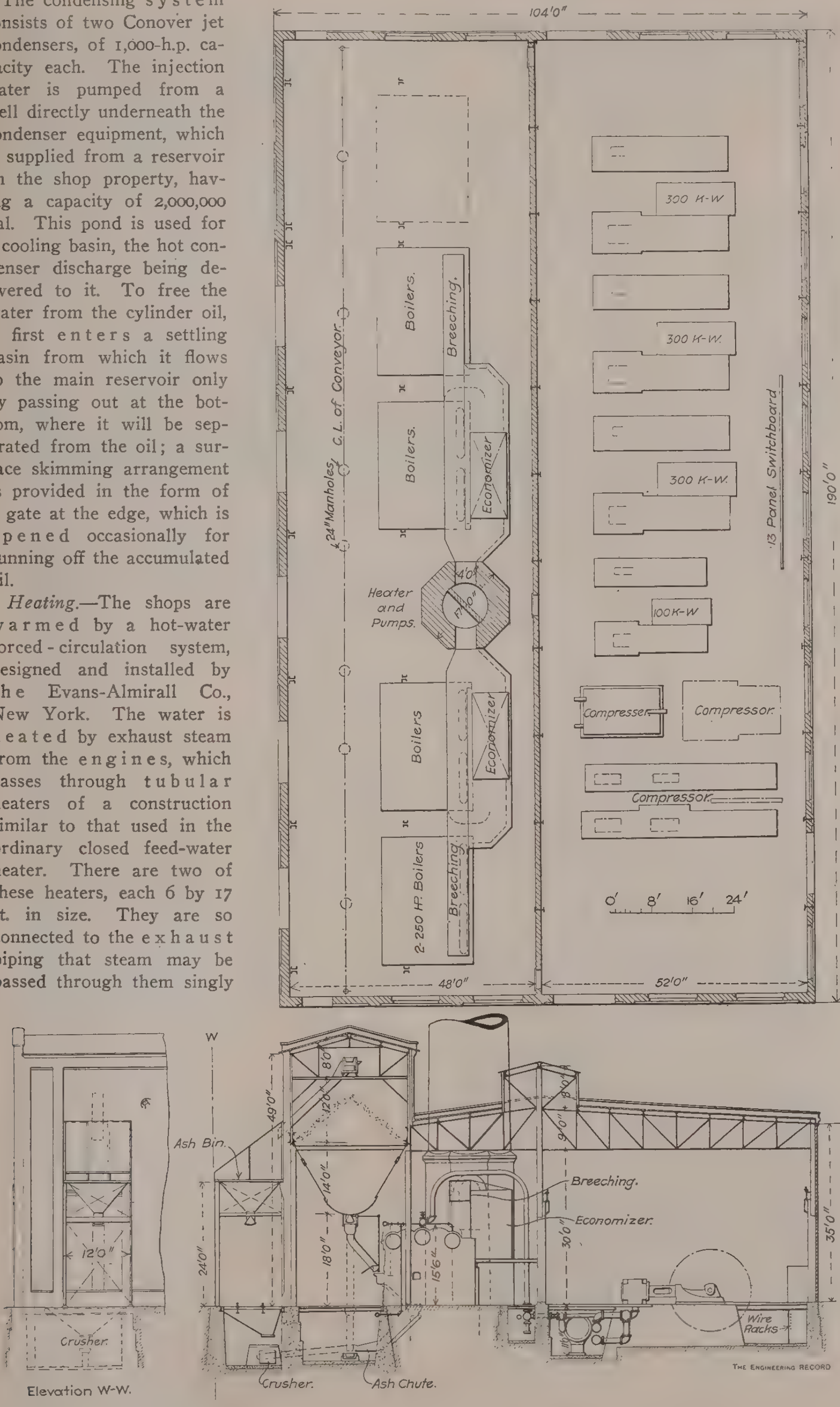
The exhaust piping system and the Conover condensers are located in an area way in the engine-room basement at the rear of the engines, which is covered with open iron gratings, giving plenty of light and ventilation. There are two exhaust lines, both 18 in. in diameter, one of which is the connection to the auxiliary exhaust apparatus and the other to the free atmospheric exhaust. Each engine has a connection to both of these lines, that to the free exhaust, however, being through a Schutte automatic free exhaust valve. The auxiliary or condenser line is so arranged as to permit exhausting direct to the condensers or to them first through the hot-water heaters in the boiler room. The open feed-water heater in the boiler room may receive its steam supply from either main.

An interesting feature of the plant is also to be noted in the exhaust-steam return connection from the compressor-erecting shop, where the air compressors are temporarily erected for testing. This line connects to the condenser exhaust pipe at the point where the branch leads out to supply the open feed-water heater.

The condensing system consists of two Conover jet condensers, of 1,000-h.p. capacity each. The injection water is pumped from a well directly underneath the condenser equipment, which is supplied from a reservoir on the shop property, having a capacity of 2,000,000 gal. This pond is used for a cooling basin, the hot condenser discharge being delivered to it. To free the water from the cylinder oil, it first enters a settling basin from which it flows to the main reservoir only by passing out at the bottom, where it will be separated from the oil; a surface skimming arrangement is provided in the form of a gate at the edge, which is opened occasionally for running off the accumulated oil.

Heating.—The shops are warmed by a hot-water forced-circulation system, designed and installed by the Evans-Almirall Co., New York. The water is heated by exhaust steam from the engines, which passes through tubular heaters of a construction similar to that used in the ordinary closed feed-water heater. There are two of these heaters, each 6 by 17 ft. in size. They are so connected to the exhaust piping that steam may be passed through them singly or in series for moderate heating, or in multiple for colder weather. Their construction and piping arrangements are such that they may also be used for heating when the engines are operated condensing, in which case the exhaust passes through them before entering the condenser. The vacuum is then varied in the condensing system to suit the outside temperature, the circulating water in the heating system being maintained at a temperature within 10° of that of the steam at the existing vacuum.

The hot water is passed through the heating coils and radiators in the buildings by the turbine-driven centrifugal pumps. One of these units is operated continuously when heating is required. The pumps are operated at a comparatively high pressure for this service, inasmuch as the volume of flow is large and the distances covered are comparatively great. The systems of heating coils in the various buildings are, in accordance with the usual practice in this system, connected in multiple or parallel, and large heating surfaces have been installed. As may be noted in the interior views of the buildings printed last week, the coils are in general located on columns and side walls of the various buildings, large banks of coils being used where comparatively high working temperatures are required.



Plan and Cross-Section of Power House, Showing Arrangement of Steam Piping and Apparatus.

The hot water may be passed through either heater singly, through both in series, or through both in multiple. Here may also be noted the installation of the auxiliary live steam heater for use in heating the circulation to higher temperatures in case the exhaust steam is not sufficient in quantity or is unavailable; this heater may be by-passed or cut into the circulating line by handling three valves. An air trap is set at the point where the line leaves the power house for freeing the system of entrained air.

Subways.—A system of subways has been installed for the pipes and wires. One of the accompanying illustrations shows the arrangement of the pipes at a point near the entrance to the station. The wires are carried on iron racks. The tunnel is built of reinforced concrete. The concrete roof is supported by I-beams and reinforced by expanded metal, and forms a walk between the principal buildings. The pipes in the tunnel are supported in all cases by adjustable swinging hangers. These hook over pins permanently fixed in the steelwork of the tunnel so that whole lines of pipe may be raised or lowered with ease to accommodate new lines.

Of the pipes installed, there is a 10-in. steam main from the power plant to the air-compressor erecting shop for testing compressors; a 12-in. exhaust main leading back, with a Cochrane oil separator in it, to the boiler room to deliver the exhaust to the heating system or condensers as desired; and a large connection from the erecting shop leading over to the power plant for delivering air compressed in testing into the shop air-supply system. This last enables the compressed air to be usefully disposed of and not wasted.

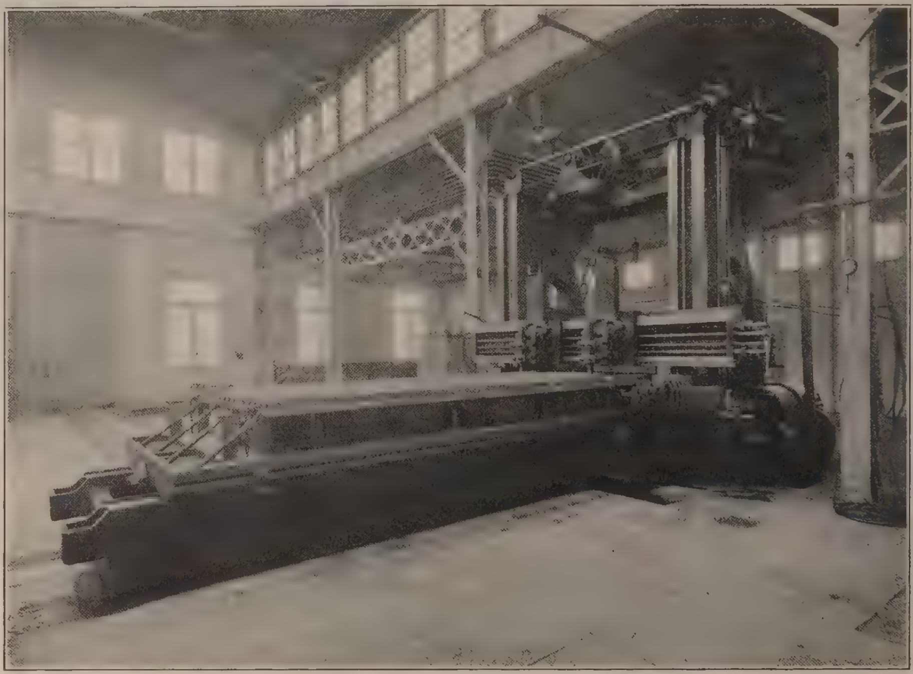
Power Distribution.—Power is distributed from the generating station by electricity and compressed air. The latter is used in all departments of the shop for hoists, hammers, riveters, motors and other apparatus. It is particularly useful in the foundry, where it is employed for the pneumatic sand sifters, tampers, tappers and in chipping hammers.

The electrical power distribution scheme and direct driving of machine tools by motors is an interesting feature of the works. All tools requiring a large amount of power and running on a variety of work have in general been equipped with individual variable-speed drives. With lathes the motor is generally mounted on a bracket over the headstock with gear connections to the driving spindle. In the case of the planer the preferable arrangement is to mount the motor above the housing on brackets, and heavy fly-wheels are used on the motor shafts for overcoming the strain on the motor at reversals of the motion of the platen. These examples will indicate the recent tendencies in methods of mounting the motors upon standard types of machine tools, in which connection it is to be noted that the most up-to-date machine tool builders are, in nearly all cases at the present, building their tools so as to be readily equipped with motor brackets for this purpose.

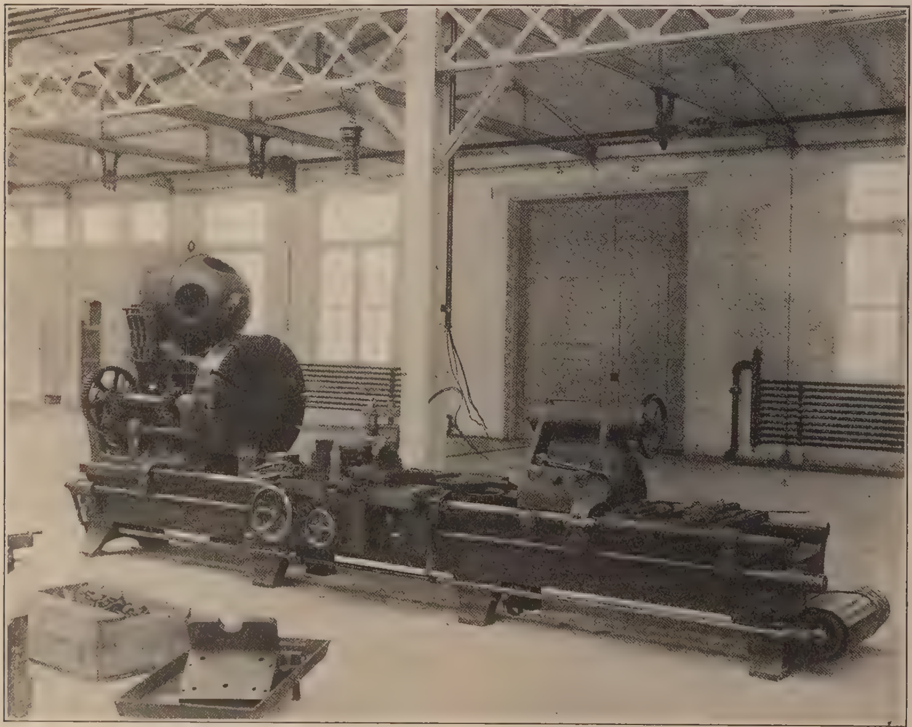
In the lathe shown in the illustration the drive to the headstock is through gearing reductions to an intermediate shaft and from the latter to the spindle through either one of three gear changes as desired, the latter being capable of easy change. In this way an individual drive with a motor having a 1:3 range and a suitable arrangement of change gears will give the tool from 60 to 80 speeds. The style of change gear is that which has been recommended by the Crocker-Wheeler Co., which supplied the motor. This mechanism provides a system of levers by which either three or four-gear trains may be thrown in, and yet so interlocked that two of them cannot be thrown in together and damage the gearing. The controller is mounted on the bed close to the floor with a splined shaft either connected directly to the controller or to it through gearing. A bracket on the carriage supporting the controller hand wheel, which also supports and guides the splined shaft, provides for turning it through a sliding sleeve which keys with it, so that the controller is readily operated by the horizontal hand wheel, the latter being, of course, at all times convenient to the operator of the tool. The large planer illustrated has a new gear for reversing the motion of the table. It will take work up to 96 in. high, 100 in. wide and 20 ft. long, and is equipped with four cutting heads, one at the side on each of the housings and two on the cross rail. The reversing is done automatically by pneumatic clutches, which act directly on the driving shaft so that all reversing of pulleys or rapidly-moving gears is obviated. This planer is driven by a 50-h.p. Crocker-Wheeler multiple-voltage system motor.

The method of variable-speed motor operation used is the four-wire multiple-voltage system of the Crocker-Wheeler Co. This system of machine tool driving uses four wires between which primary voltages of 40, 80, 120 and 240, and the auxiliary voltages of 160 and 200 may be obtained, the unbalanced intermediate voltages being secured by a motor-generator balancer set of the three-generator type. This has all three machines mounted upon the same shaft in tandem, with their armatures connected in series across the 240-volt power distribution mains; one of the machines is wound for 40 volts, another for 80 and the third for 120 volts, so that when in operation as motors any one of three may become a generator to supply current at its voltage for balancing the system, when it would be operated by the other two motors. In this way the variations in power consumption among, or the unbalanced series load between, the legs of the four-wire system are met primarily through the main 240-volt system, the balancer set distributing the supply and equalizing as required.

The four wires of the multiple-voltage system are carried through the machine shop beneath the floor in bituminized conduits about 12 in. under the surface, these conduits ending in floor plate openings, adjacent to every building column. The branch leads are connected to the mains under the floor plate and run out through a short length of loricated conduit. This does not interfere with shop operations, as the floor box is covered ordinarily by a heavy cast-iron plate. The branch conduit leading up through the floor is in most cases run up alongside the nearby building column, although it is equally possible, if it is desired to locate the machine half-way between two adjacent columns, to chisel a channel in the concrete floor and locate another loricated conduit so as to lead out from the floor plate opening to a point closer to the machine to be served.



The Electrically-Driven 100-Inch Planer with Special Pneumatic-Clutch for Reversals.



A Typical Variable-Speed Motor-Driving Application to the Shop Tools at the Ingersoll-Sergeant Plant.

A Concrete Power Dam at Lansing.

A concrete dam has recently been completed at Lansing, Mich., by the Piatt Power & Heat Co., which contains drum gates of the Taintor type. At one end of the dam is a 48-ft. intake to the water-wheels, then comes the main rollway, 117 ft. long, and at the other end there are three spill-gate openings, each 20 ft. in width. The dam terminates in an earth embankment, with a corewall averaging 2x8 ft. The dam is built on the rock bottom of the Grand River, in which a trench 2 ft. wide and 4 ft. deep was cut to prevent the footing from sliding. The rollway is 17 ft. wide at the base and 4½ ft. at the crest; the upstream face is vertical and 24 ft. high. The piers for the spill-gates are 4 ft. higher, and the gates themselves are of the cylindrical balanced type, which seems to be a special favorite in Michigan; an illustration of one of these gates was printed in The Engineering Record of Jan. 13, 1900, in a description of the station of the Kalamazoo Valley Electric Co. There are four 50-in. Samson turbines rated at 1,000 h.p., in the plant, of which this dam is a part.

The dam was constructed one-half at a time, the intake to the wheels and the rollway being first completed. A cofferdam of sandbags was first built, and backed by plank where the leaks were most troublesome. Both centrifugal and rotary pumps were used in keeping the water out. After the site was enclosed and drained, the trench in the bottom was cut and tight forms of 2-in. matched plank were built. Runways for wheelbarrows were then laid from the bank over the water alongside the forms, and a Ransome mixer was set up on the bank.

The concrete was composed of one part of Portland cement, and six of sandy gravel with no pebbles larger than ½ in. in size. It was made wet, and very little tamping was required to bring moisture to the surface. The material resembled mortar more than ordinary concrete in appearance. No steel reinforcement was employed, except a few Johnson bars in the land intake pier. When the first half of the dam was completed, the second half was constructed in the same way. The time of construction was 4½ months, and no difficulties or delays were caused at any time by high water.

Detailing Steelwork for Bui'·

There are probably many e\ ...o are turning out good general dra the steelwork for buildings, particu buildings, who have experienced som in reaching a satisfactory system of n their drafting rooms. The shop p different structural steel manufacture considerably, and it is practically out of ion for most engineers to do more th te what they desire in a general way, l e contractor to work out the details to c ith his usual methods. Nevertheless there e things that are common to all such nd the following sketch of them, contri! Mr. A. F. Gordon to the "Rose Technic nterest as showing current practice in so s.

In roof tr Fink truss seems to find the most favor. older designs of trusses the tension me vere either I-bars or loop rods, but now c m meets with them. Some engineers s ify such kinds of members. The usual p now is to make all members of angles xcessive spans, or where there are addi al loads on the lower chords due to machi the lower chords are made up of channelComplete details are not often given for roc usses, that is, not all the rivets or members are ated but merely indicated and left for the ten shop to lay out on the floor the main dimens, panel points and all field connections bei given.

Thndenser and the Double-Exhaust Steam Piping Connections in the Ingersoll-Sergeant Power Plant.

ses are riveted up complete in the shop as far possible. Where splices occur in the lower cho splice bars or plates must be used on the bot to allow for the loss in section. Material sho be ordered a little longer where there are splic o allow for milling or neat shearing, and where possible cut members square and avoid skew cu The most general pitch for roofs is ¼ pitch; at is, the rise is one-fourth the span. Upper c ds are composed of two angles back to back a where additional strength is required a plate inserted between them throughout their entire ngth, giving more depth to the chord.

P ns are made either from channels or angles ngles being used for bays up to 15 ft. and tru d angles for bays up to 20 ft. For longer bays channels are used. The trussed purlins are composed of the purlin angle proper with a ½-in. rod or sometimes a light angle as the truss member and angles acting as the post member. Channel purlins should never be connected to rafter angles through their flanges, and in all cases connect purlins by lug angles riveted to rafter. Purlins are not required to be riveted but are bolted to connecting lugs. In line with this it might be stated that it costs on an average about 10 cents to drive each field rivet, so where connections can be bolted the saving in cost is considerable. The great cost for field riveting comes from the necessity for the erection of scaffolding.

One-half inch diagonal sag rods should be provided for purlins in bays 15 ft. or over to hold them more rigidly. The two purlins nearest the ridge are connected together and then separate rods connect between each pair of purlins down the roof clear to eave struts.

The general section of columns for mill buildings is the plate and angle section composed of a web plate and two angles riveted back to back, forming the flanges. This is about the strongest section for the amount of metal used that can be made. For very heavy loads, such as for heavy cranes as in open-hearth furnace buildings, channel columns are used.

Column bases are riveted to the column in all cases and as few rivets put in the bottom as are consistent with the size of column, as these have to be countersunk by hand on the bottom and mean extra expense. The ends of columns resting on the base plate are milled to give a true bearing for the column, and the material should be ordered a little longer than actually required. The top of a column should also be milled where a cap plate is used. The holes in base plates for anchor bolts should be about one-fourth larger than anchor bolt to allow for slight adjustment in column in erection. A cheap and serviceable form for anchor bolts is to use one rod and bend it in the form of a U, forming a double bolt. This does away with anchor plates which are apt to get misplaced or lost.

The bracing of a mill building by the system of rods is not often given the consideration it ought to have. Each separate building may require a different system of bracing and must be looked into individually. In general, though, all end bays should be securely braced with rods in the upper chords of the trusses, lower chords of the trusses and in the sides of the building between columns. In all cases where two sets of rods are required in any one plane, a strut must be provided between them, and in the case of trusses, these are most often composed of small I-beams and it is more preferable to run the rods to points near the ends of the beams than to the trusses, so as not to cut out any material in the truss section. Pin-connected rods are seldom used now, as they are more expensive, but sometimes are specified where engineers are very particular that material shall not be cut away in web members. Ordinarily bevel washers are used and slots cut in webs of members to take them. They are made in pairs and one part slides on the other giving a bearing for the nut, and allowing movement through quite an angle. Rafter rods are usually ¾-in. diameter, and ends upset to 1 in. for a distance of 4 in. The lower chord rods are ⅞ in. diameter upset to a 1¼-in. diameter, and side rods are 1 in. upset to 1⅜ in.

The most usual covering for mill buildings is corrugated iron or steel, the best grade for corrugated iron being the rerolled muck bar iron. The corrugations are approximately 2½ in. wide and ¾ in. deep. The gauge used for roofs is either No. 18 or No. 20 U. S. gauge, and to be always specified as such. For sides of buildings either No. 20 or No. 22 gauge is used. The sheets are 30½ in. wide before corrugating, and allowing for laps will cover 24 in. after corrugating. The end laps for roofing are 6 in., and for siding 4 in. Sheets should be ordered in even foot lengths whenever possible, as an extra amount is charged for cutting odd lengths. The spans for corrugated sheeting should not be over 6 ft. for roofs and 7 ft. for sides, although this is sometimes exceeded for the sides of buildings. The sheeting is fastened to the purlins by clips of hoop iron ¾ in. wide, No. 18 gauge, and are about 1 ft. long for angle purlins and about 1½ ft. for channel purlins. A clip is allowed for every linear foot of purlins or girts. The hoop iron is ordered in bundles of 100 lb., which contain about 800 ft. The clips are fastened to the sheets and to each other by 3/16x⅜-in. roofing rivets, allowing 15 rivets per sheet.

A strut should always be provided at the eaves to take up the longitudinal stresses at the tops of the columns and heels of the trusses. This also supports the roof at the eaves. It is best to make this quite heavy, usually of two angles each for the top and bottom flanges, connected by lattice bars. This strut should not be over 2 ft. deep. Side struts should be provided under windows, especially under continuous or lifting windows. Sometimes these struts are required to be quite deep to suit some requirements in the building, and when they are over 2 ft. deep, angles should be used for latticing instead of bars, for additional stiffness. Single angle girts are used to support the sheeting on the sides of buildings, and often sag rods are carried down from struts to support them the same as for the purlins.

Crane girders should be carefully designed and stiffened to take the load required for them. A shelf should be provided for them on the column and so designed as to take the entire load. The ends of the girders should be milled and connected to the web of the column and to each other. Sometimes a knee-brace is used from the bottom of the girder to the column, though this is not allowed by all engineers, as the brace may come a little long, in which case the bearing on the column may be affected and the knee-brace take the entire load. The rails are connected to the girder by cast-iron clips in some cases, and in others by hook bolts hooking over the flange of the girder and passing through the web of the rails.

There are a number of different styles of windows used in the ordinary mill building varying in adaptation to different classes of buildings. A few will be mentioned and their method of erection given. The most common are continuous sliding, continuous fixed, continuous windows on trunnions, both vertical and horizontal, continuous balanced, both two and three sashes high, and the corresponding single frames for the above.

The sashes come in two thicknesses, 1⅜ and 1⅞ in. thick and the frame of the sash usually 2¾ in. deep, ¼ in. being allowed for muntins. The number of lights, quality and size of glass to be used should always be specified on the design. In frames with movable sash ¼ in. should always be allowed for clearance. The top and bottom sills of the window frame are 1¾ in. thick.

Angle girts are to be provided with holes in the outstanding leg spaced about 3 ft. to which nailing strips are bolted by ⅝ in. diameter bolts, the heads of the bolts being countersunk in the wood. These strips are 3x1½ in. for the top and 3x2½ in. for the bottom of the windows. The window frames are then nailed to these strips.

The frames are shipped to the site of the building knocked down and should be ordered in the following way: The total number of sashes, giving number of pairs, height, width, thickness, total number of lights, size and quality of glass, number of different frames for the sashes, giving length out to out of end posts, complete with nailing strips, as per the sketch sheet which should accompany the order.

The balanced lifting windows are provided with 3/16-in. wire rope attached to the top of the sashes, passing over a small pulley in the top of the frame. The sashes are supposed to counterbalance each other, and as one is raised the other is lowered, making a cheap and serviceable counter-balanced sash. Then there are the ordinary weight counter-balanced sashes more commonly used in brick walls.

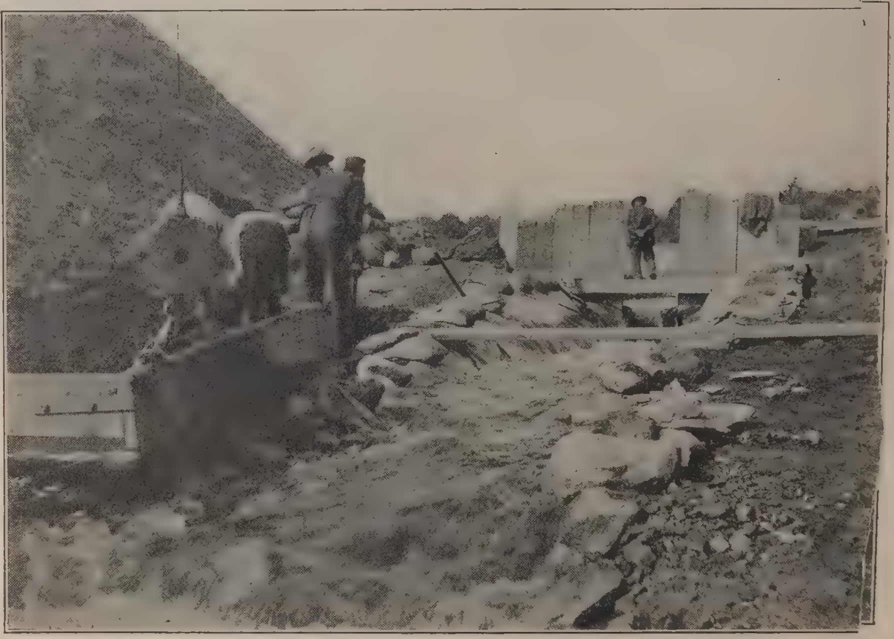
The estimation of the quantities of paint required on steel work is apparently rather difficult to arrive at, but is not so hard as it seems. A very simple method is as follows: Count one gallon of oxide of iron paint as covering 400 sq. ft., one gallon of red or white lead 350 sq. ft., one gallon of asphaltum paint 300 sq. ft., and one gallon of graphite paint 800 sq. ft. To find the amount of paint required take the estimated weight of the building or structure, say 450,000 lb. of frame work and 30,000 sq. ft. of corrugated steel. Assume the average thickness of the metal, which will probably be ¼ or 5/16 in. for ordinary mill buildings, take the weight of a square foot of this, which for 5/16 in. thick will weigh 12.75 lb. per square foot, divide the total weight of the building by this amount, which will give the number of square feet of surface to be painted twice (both sides), in this case it will give approximately 35,300 sq. ft. Taking twice this gives 70,600 sq. ft. To this add the actual number of square feet of corrugated steel surface plus 10 per cent. for corrugation, which would be 33,000 sq. ft. one side, or 66,000 sq. ft. both sides. Total number of square feet to be painted, 136,600. Divide this by the number of square feet one gallon of the kind of paint to be used will cover, in this case for black graphite 800 sq. ft., which will give approximately 171 gal.

Two Steam Turbines of the Parsons type at the Neepsend station of the municipal electric works at Sheffield have been using 22.41 lb. of steam per kilowatt-hour in regular operation. They are together rated at 1,500 kw. and have been running at about 1,000 kw. during the day and 1,400 to 1,600 kw. at night. During the ten weeks that the above steam consumption has been registered, the steam pressure averaged 190 lb., the superheat 100°, the vacuum 27 in., and the speed 1,500 r.p.m. The units run 16 hours a day.

Reconstructing an Earth Dam at Worcester.

The earthen dam of an impounding reservoir in the municipal water-works system of Worcester, Mass., was recently breached and reconstructed in an interesting manner. The dam was an old structure of rather uncertain character, built many years ago to impound water for manufacturing purposes, and at various times had showed signs of weakness until in September, 1903, it became evident that it could not be used longer with safety, unless reinforced. In the fall of that year Mr. Frederick A. McClure, city engineer of Worcester, breached it in order that the reservoir could not be filled again until the dam had been reconstructed.

The breach was begun with a width of 60 ft. to allow sufficient space when the excavation reached the required depth. A simple but effective method was employed to prevent too rapid erosion in the opening, as it was carried down. As the bottom of the breach approached the level of the water, a strong bulkhead of timber, with a sluice gate, was built in the embankment some 20 ft. below the water's edge, and secured in such a manner as to allow about 3 ft. of the water in the rservoir to be drawn off from the surface at a time.


Breach in Dam Showing Bulkhead and Method of Anchoring Sail Cloth.

A trench of the desired capacity was excavated through the entire dam below, and for a short distance above the bulkhead and lined with heavy sail cloth, securely fastened to the bulkhead and anchored with sand-bags throughout its length, as shown in the accompanying illustration. The remaining earth between the bulkhead and the basin was then removed, allowing the water to flow to the bulkhead and then through the sluice gate as desired. When the water in the reservoir was drained to the depth of the trench, the bulkhead was lowered, and the operation repeated until the bottom was reached. The sail cloth proved a perfect conveyor and permitted large volumes of water to pass over it without washing the earth in the trench beneath it.

The original waste pipe through the dam being only 12 in. in diameter was entirely inadequate as a measure of control, and a new and larger waste pipe was laid in the excavation made in draining the reservoir. During the reconstruction of the dam a concrete valve chamber, with a brick superstructure, was placed near the toe of the outer slope of the embankment, and two Chapman valves, one for emergency purposes and a tell-tale pipe for obtaining the depth of water in the reservoir at any stage.

The dam [illegible] as reconstructed has a length of 1,158 ft., and a horizontal width on top of 18 ft. The inside face has a slope of 2 to 1, with a 5-ft. berme 5 ft. below the level of the weir, and the back face has a slope of 3 to 1. The earthen part of the structure was raised from 4 to 5 ft. above the top of the old dam, and the crest of the weir is now 3 ft. higher than formerly.

The new part of the work is placed on the upstream side of the old embankment, the face of which was removed to procure space for the masonry used in the reconstruction. A concrete core wall was built the entire length of the dam, and extended well into the hills which rise at either end. The top of the core wall is about 2 ft. thick and about 2 ft. above the level of the weir. The foundations for it were carried to a firm ledge throughout where the depth of water exceeded 13 ft., and in the remaining portions it was built on a very compact hard-pan. The excavations reached the maximum depth of 24.9 ft. below the draft pipe, and for the greater part were remarkably free from water. The conerete in the core wall was mixed in the proportion of one part Lehigh Portland cement, 2½ parts crusher sand and 5 parts broken stone. The wall was plastered on the upstream face and the crusher sand, which was used almost entirely in the concrete, [illegible] said to have given very satisfactory results.

The earthen portion of the new structure [illegible]s of selected material, principally hard-pan, placed in sufficiently thin layers to admit of thorough compacting, sprinkled when required and rolled with a grooved roller. The entire surface exposed to wave action is protected by heavy riprap, [illegible] the top and back side of the embankment are [illegible]ered with loam and graded. The old spillway has been in use for several years, and was composed [illegible] good ashlar stone, which were used as far as possible in the reconstruction, most of the side walls being left intact.

Raising the flow line to the height now [illegible]ained necessitated the construction of a dike [illegible]g one part of the reservoir to prevent water [illegible]m flowing over a divide into an adjacent [illegible]ey. This dike is 600 ft. long, the interior portion being of loam sprinkled and rolled as it was [illegible]ed, and faced with gravel. Its inside face has [illegible]lope of 4 to 1, and is riprapped with field stone [illegible] considerable amount of spoil excavated from [illegible] basin was placed on the back side of the dike [illegible]re a convenient site occurred for its disposal.

The basin of the reservoir was cleane[illegible]ile the dam was being reconstructed. Heavy deposits of mud were encountered in the greater part of it, and as but few places for disposing of the material were accessible to the construction drains employed, the length of haul was in some instances excessive. The shores and other places that were not convenient for train service were cleaned with the aid of teams. Ditches were dug in preparing the material for removal, and the work was kept comparatively dry by a system of small dikes and the use of centrifugal pumps. In parts of the basin it was found impracticable to remove all the mud, and in these cases the remaining portions were covered with gravel, 18,000 yd. of which were used in the work.

Book Notes.

A directory of the architects and builders of Detroit has been published at 50 cents by Frank A. Barrett, 458 Fourth Ave., in that city. In addition to the directory the book contains the ordinances governing the construction of theaters, the local and State building laws, the plumbing regulations, and the State mechanics' lien laws.

An example of enterprise which will be appreciated by American engineers is the publication of a translation by Mr. Franz Welz of the official report on "The Berlin-Zossen Electric Railway Tests of 1903." This report has never been made public in Germany or elsewhere before this, and hardly any information concerning the tests is available for general use. The trials described in this report are of the deepest interest to all students of the problems of high-speed traction, either by electricity or steam. The translation is introduced by a valuable discussion of train resistance, by Dr. Louis Bell. (New York, McGraw Publishing Co.; 8vo, cloth, $3.)

A good many people desire to have an accurate list of the electric central stations of the country, so it may be pointed out that such a list is issued semi-annually by the McGraw Publishing Co., New York. The last number appeared a few days ago, and is a book of 348 pages. The stations are arranged alphabetically by cities under the different States, and the contents include the stations in Canada, Newfoundland and Mexico. The information comprises a list of the officers, a memorandum of the capital stock and bonds, a statement of the equipment, and notes concerning the number of lights, the power service and the system of distribution used. The data are collected from the companies, and every precaution is taken to make them accurate. The list is supplied only by annual subscription.

The Automobile Pocketbook. By E. W. Roberts, Cincinnati. The Gas Engine Publishing Co.; flexible leather, 32mo, 337 pp., $1.50.

The author of this book is an experienced designer of gas and gasoline engines for many purposes, including automobiles, and is the author of an excellent book on gas engines and their troubles. In this little handbook he explains the method of operation of gasoline automobile engines, the details of their various parts, the methods of transmitting power to the running gear, the troubles that may arise in each part and their remedies, and the main structural features of the frames, wheels, brakes, and other parts that are of a mechanical nature. In fact, he covers about all those subjects that the owner of an automobile has any occasion to know, and does it with a clearness and freedom from technicality that is surprising.

A book describing in popular language the many uses to which cement is put has been prepared by Prof. F. H. Eno as one of the bulletins of the Ohio Geological Survey. As its object is solely to explain to people who are without technical training the advantages of concrete for many purposes, it is unnecessary to look upon some of the statements in the same light that would be necessary were the report a technical treatise. For the purpose intended the volume seems to be suitable. It gives little information concerning the methods of designing or building concrete works, but explains with the aid of many well-chosen illustrations the various classes of structures made of the material. The cement industry of Ohio is developing rapidly, and this book will undoubtedly assist this growth by furnishing the people of the State with suggestions of value in their building operations. In case a new edition is required, it would probably be advisable to explain more in detail the use of concrete blocks and monolithic concrete in buildings, which is now being developed rapidly in Ohio.

American Telephone Practice. By Kempster B. Miller. Fourth edition, enlarged and entirely rewritten. New York, McGraw Publishing Co.; 8vo, cloth, 904 pp., $4.

When the first edition of this book appeared, it was immediately recognized as a comprehensive and authoritative treatise. The importance of the telephone made the subject one demanding study, but at that time few engineers recognized the great strides in all branches of telephony that would take place. The popularity of the book has been surprising for a technical treatise, and has warranted the author in carrying through the long task of rewriting and enlarging it into its present form. In this rewriting obsolete equipment and methods have been passed over except when they possessed distinct educational or historic value, and for this reason parts of earlier editions are omitted in this one.

The book covers telephone practice comprehensively and thoroughly, and is arranged in a logical order which makes it particularly easy to use for reference purposes. The common battery or central energy systems receive much more attention than in previous editions. The articles on trunking between common battery offices, private branch exchange service, measured service, toll switchboard systems and power plants furnish new information, and the same is true of the section on automatic switchboards. In describing these late developments of the art, the author has employed illustrations freely, and this feature of the treatise makes it particularly clear and readable.

Rock Excavation. By Halbert Powers Gillette. New York, M. C. Clark; cloth, 12mo, 384 pp., $3.00.

On the first page of this book the author says: "A small cabinet of the common species of minerals may be purchased for a few dollars from any of the dealers whose advertisements may be found in the mining and civil engineering journals. Such a cabinet, when studied with the aid of a small book on mineralogy, will enable one to undertake the work of rock excavation intelligently." This quotation gives a good idea of the curious mingling of sense and nonsense in some parts of the book. Probably an experienced man will find much useful information in the volume, but the student who gathers data for his undergraduate work from its pages is likely to be misled in many places. Moreover, the text is often rather lacking in information of any value; for example, limestone is defined as "the rock from which lime is made," sandstone as "sand cemented together," and shale as "baked clay or mud, generally yellow, brown or black in color and easily split into leaves." These definitions recall that of gold as a yellow metal very agreeable to the touch.

While faults like these detract from the value of the book to inexperienced readers, there is a great mass of information in it which is of use to those able to employ it with discernment. The author has collected data from many sources, published and unpublished, concerning the methods and cost of rock excavation in the open and in tunnels of many types. He discusses the methods of drilling by hand and with power drills, the character and use of explosives, the methods of blasting, the cost of loading and transporting rock, and the organization adapted for rock excavation under different conditions. The labor spent in securing the data deserves recognition, for it must have been great and directed with much care. As a whole the book is a decidedly valuable one on a subject that has received little attention in engineering manuals.

A Handbook for Superintendents of Construction, Architects, Builders and Building Inspectors. By H. G. Richey. New York, John Wiley & Sons; flexible morocco, 16mo, 750 pp., $4.00.

Everybody who is familiar with the work done by superintendents of building construction and by inspectors knows that a good reference book for these classes will be very useful. Such a book must be small enough to be carried in the pocket, and its contents must be sufficiently complete and practical to answer the thousand and one questions that arise in such work. It is probable that Mr. Richey has written such a book, for it bears evidence of being prepared to answer just those questions that the author has had to decide in his own work as superintendent of construction on U. S. buildings. The tendency in compiling such manuals is to pad them with all sorts of data which look useful, but prove of little assistance when investigated. The fact is overlooked that the information required by an architect in laying out the structural details of a building is not always useful to the superintendent, while the latter often requires data and suggestions of no use to the former. This distinction seems to be well observed in selecting the data for this book.

In a general way its contents may be summarized by stating that it starts with the laying out of the excavations, and follows the work through to completion in the order in which building operations are generally conducted.

Attention is paid to the building code requirements of New York, Philadelphia, Chicago, Baltimore, Cleveland, San Francisco and the National Board of Fire Underwriters. Enough information is given regarding the strength of materials and the design of simple structures to enable a superintendent to lay out whatever auxiliary works may be required, while the hints concerning those features of detailing that are sometimes omitted on architects' drawings are in accordance with the practice on federal buildings. Taken all in all, the book is one of the best examples of compilation for a special purpose that has appeared in some time.

A Treatise on Concrete, Plain and Reinforced. By Frederick W. Taylor and Sanford E. Thompson. New York, John Wiley & Sons; cloth, 8vo, 603 pp., $5.00.

This book on the materials, construction and design of concrete and reinforced concrete works has been in preparation for a number of years, and the authors have endeavored to present a work of much practical value. It is only just to acknowledge that they have succeeded in this aim, although there is in some parts of the book an evident inclination to use data without investigating the reliability of their source, and to deduce general rules from experimental information of limited range. For this reason some of the most elaborate suggestions are of questionable worth; for example, the elaborate tables for proportioning the amount of cement for concrete of varying richness seem to be based on the use of cement and sand of a particular character that may not be available for most work. It is this tendency to construct elaborate working rules from data only occasionally applicable to a given set of conditions that makes the book a somewhat dangerous one to employ without a very careful examination of the premises on which the authors construct their deductions. Fortunately these premises are usually given, and the careful engineer is thus able to employ as much or as little of the book as he considers suited for his purposes.

Outside of this general criticism, only praise can be given to the book. It represents the results of a manifestly careful inquiry into all branches of concrete work, as carried on at the present time. Much of the information represents the results of the authors' own work, and explains the methods of carrying on construction that they have employed. Three of the chapters were contributed by acknowledged specialists of high authority; Prof. Spencer B. Newberry writes on the chemistry of hydraulic cements, Mr. William B. Fuller on proportioning concrete, and M. Feret on the effect of sea water on concrete and mortar. Outside of these three chapters, it is probable that those on the voids and other characteristics of concrete aggregates, on the strength of plain concrete, and on building construction will prove of most interest. The comprehensive character of the book is such that hardly any question can arise in connection with concrete construction which will not have some light thrown on it by the information in this volume.

Letters to the Editor.

DURABILITY OF STEAM TURBINE VANES.

Sir: We have read with much interest the letter which appeared in the columns of your paper dated April 8, under the title "Durability of Steam Turbine Vanes." Unfortunately the photographs that are questioned and that form the basis for the discussion, are not reproduced for the benefit of your readers. It is manifestly impossible to base one's judgment on the facts as presented, when the latter are not known to be absolutely true, but rather are the results of supposition. We refer to the conclusions reached in regard to the doubted photographs.

There is nothing shown to illustrate the basis for these inferences, so one is really handicapped in forming an unbiased opinion on the relative appearance of the vanes assumed to have been purposly damaged, and those presented as evidence in support of the contention that the wear from erosion is negligible in the Parsons type of turbine.

Exhibit No. 1 would give one the impression that the edges of the blades were damaged by contact with some stationary part of the machine rather than by broken particles of other vanes. This would seem a reasonable inference in view of the fact that the casing had been distorted accidentally. Exhibits Nos. 2 and 3B are not especially clear in detail, and are open to the same suggestion advanced in reference to the disputed photographs, viz., that a skillful photographer can, by adjusting lights, shades and focus, create most convincing effects.

They do illustrate, however, an irregularity in the vane setting, and from the alignment of the rows, we should suspect that many of the vanes would be scored similarly to that reproduced in Exhibit No. 4. In making these criticisms, we realize that we may have been deceived, and may have formed a wrong impression from the illustrations, although we have studied them as carefully as their clearness would permit.

Yours very truly, FRANK B. PERRY.
Allston, Mass., April 13.

THE STRENGTH OF REINFORCED CONCRETE.

Sir: In using an empirical formula in engineering computations, one must not disregard the meaning of the constants that appear, and a rule of thumb, applicable only within a limited range, is likely to be a dangerous tool in the hands of those who are in the greatest need of such short cuts to practical results.

In the paper on "The Strength of Reinforced Concrete," abstracted in your issue of April 1, the formula for moment of resistance, $M = (mP + 55)\ bd^2$, is presented as safe to use "for average rock concrete of the composition of one of cement, three of sand and six of broken stone, 1 in. and under in size, dust screened out," where P, the percentage of steel, is not less than 0.5, nor more than 1.25. In this formula the value of m is to be taken as 450 for high elastic steel bars with positive bond to concrete, and 275 when plain bars of ordinary structural steel are used.

By applying this formula to the results of the tests quoted in the paper it is found that the value of m must vary from a minimum of 200 to a maximum of about 650 in order that the formula shall express the actual moments of resistance developed, and that the value of m must vary from 200 to 440 if the formula is to fit the results obtained with only the plain bars of low elastic limit. Although these variations in the value of m may seem rather large, yet considering the differences that existed in the quality of the concrete the range is in reality small and indicates that the values of the constants have been well chosen.

What the present writer has to say in discussion of this formula is rather in the line of explanation than of criticism, and he therefore deems it unnecessary to defend the rational formulas used in computing the theoretical bending moment in the table presented below (Table I).

For this purpose the simple formulas (from "Cement and Concrete," McGraw Publishing Co.), deduced by assuming a constant modulus of elasticity and neglecting the tensile strength of the concrete have been used, but the principle would be as well illustrated had other similar formulas based on recognized laws of flexure been employed. It will be generally admitted that the behavior of concrete-steel beams does not so far depart from these laws as to make them quite inapplicable.

In the following table, P, M and m have the same significance as in the paper under discussion, F is the assumed elastic limit of the steel in pounds per square inch, while f represents the extreme fiber stress in concrete. The concrete is supposed to be strong enough to develop the full elastic limit of the steel, and the resulting fiber stress in the extreme fiber of concrete is given in the columns headed F. The values of M have been computed from the formulas mentioned, assuming b and d to be each 10 in., and m is obtained by the expression

$$m = \frac{(M \div bd^2) - 55}{P}$$

The values of P are extended beyond practicable limits for purposes of illustration.

TABLE I.—THEORETICAL BENDING MOMENTS WITH DIFFERENT PERCENTAGES OF REINFORCEMENT.

	Assumed value of F, 30,000 lb. per sq. in.			*Assumed value of F, 60,000 lb. per sq. in.*		
	Moment of Resistance	Value of		Moment of Resistance	Value of	
P	M	f	m	M	f	m
0.2	56000	554	5	112000	1108	285
0.4	108000	824	130	216000	1648	402
0.8	208000	1246	191	416000	2492	450
1.0	259000	1436	204	518000	2872	463
2.0	495000	2260	220	990000	4520	467
3.0	720000	3000	222	1440000	6000	462
4.0	940000	3700	221	1880000	7400	456
5.0	1156000	4380	220	2312000	8760	451

If for any value of P in the table we compare the two values of M we find the moment of resistance with 60,000 lb. steel to be double that for 30,000 lb. steel, but it is noticed that the corresponding values of f bear to each other the same ratio. That is, by doubling the strength of the steel we can increase the strength of the beam in the same ratio only by a corresponding increase in the fiber stress of the concrete.

Comparing the results obtained for different percentages of steel of the same character it is seen that to multiply the percentage or area of steel reinforcement by a given ratio increases the moment of resistance by a nearly equal ratio, and that the stress in the extreme fiber of concrete is also increased, though in a relatively smaller degree.

It is of interest to notice that after a certain percentage of steel is reached the value of m is nearly constant for increasing values of P. Had the tensile strength of the concrete been considered in determining M the values of m for low values of P would approach more nearly the constant value.

The point which the writer would emphasize, and which seems to have been overlooked by the author, is that for a given quality of steel every quality of concrete has its proper percentage of reinforcement if the stress developed in each material is to bear a given ratio to its elastic limit or ultimate strength. In other words, the percentage of reinforcement is fixed by the relative working stresses allowed, and the relative moduli of elasticity. To use a smaller area of steel than this specific percentage is to lower the working stress in concrete, while the use of a larger percentage, or excessive reinforcement, results in lowering the working stress of the steel below the assumed safe value. To illustrate, with an extreme example from the table, if with concrete having an ultimate strength of 3,000 lb., and therefore capable of carrying 3 per cent. of 30,000 lb. elastic limit steel, we use in reality only 1 per cent., the concrete will be stressed only to 1,436 lb. per square inch, and we might as well have used a cheaper concrete. The use of the formula presented in the paper results in reducing the factor of safety for concrete as the percentage of reinforcement is increased.

Yours truly, L. C. SABIN.
Sault Ste. Marie, Mich., April 10.

A DUST-COLLECTING SYSTEM of an unusual type and large extent has been installed at the Montreal shops of the Canadian-Pacific Ry. It was designed and erected by C. H. Gifford & Co., of Philadelphia, and consists of seventeen Sturtevant exhaust fans and six very large dust-collectors. The chips, shavings and sawdust are drawn from the machines and forced long distances to the collectors, whence they are in turn drawn to a secondary set of collectors and exhaust fans located above the boiler house. These fans rehandle the refuse and discharge it either direct to the boilers or, when the amount is excessive, to a shaving vault or to cars by means of which it may be carried away. The economy of this method of handling refuse is evident from the fact that enough is thus collected to operate 1,700-h.p. of boilers. The system is capable not only of handling the light, thoroughly dry refuse from the cabinet shop, but also that which is made by the heavy machines in the planing mill. This latter is largely of oak, wet, heavy and stringy, and is frequently combined with an inch or more of ice on the outside of the timber. It has been the custom in many cases in the past to buy the smallest fans and operate them at the highest speed, with consequent excess in the use of power. In this instance the power required to operate the fans is fully one-third less than would have been necessary if the system had been installed along the lines which have heretofore prevailed. The saving in power will probably be enough to annually pay the total first cost of the additional equipment which was necessary to secure the increased efficiency.

CURRENT NEWS SUPPLEMENT

APRIL 22, 1905.

ECTORY OF NATIONAL TECHNICAL SOCIETIES.

IERICAN SOCIETY OF CIVIL ENGINEERS. Sec-y, Chas. Warren Hunt, 220 West 57th St., York. Annual convention, Cleveland, June ;. Next meeting, May 3.

IERICAN SOCIETY OF MECHANICAL ENGINEERS. etary, F. R. Hutton, 12 West 31st St., New . Next meeting, New York, April 25, p. m.; last reunion of the season, to which s are invited; paper by Mr. G. C. Hen- on diamond tools.

IERICAN INSTITUTE OF ELECTRICAL ENGI-s. Secretary, Ralph W. Pope, 95 Liberty New York. Annual convention, Asheville, C., June 19-23. Next meeting, at Carnegie April 28; four papers on meter subjects.

IERICAN INSTITUTE OF MINING ENGINEERS. etary, R. W. Raymond, 99 John St., New .

IERICAN INSTITUTE OF ARCHITECTS. Secre- Glenn Brown, Washington, D. C.

SOCIATION OF ENGINEERING SOCIETIES. Sec-y, John C. Trautwine, Jr., 257 South th St., Philadelphia, Pa.

IERICAN SOCIETY OF HEATING AND VENTI-IG ENGINEERS. Secretary, W. M. Mackay, Water St., New York.

NADIAN SOCIETY OF CIVIL ENGINEERS. Sec-y, Clement H. McLeod, 877 Dorchester St., real.

CIETY FOR THE PROMOTION OF ENGINEERING ATION. Secretary, Prof. M. S. Ketchum, ersity of Colorado, Boulder, Colo.

IERICAN SOCIETY FOR TESTING MATERIALS. etary, Prof. Edgar Marburg, University ennsylvania, Philadelphia, Pa.

IERICAN SOCIETY OF MUNICIPAL IMPROVE-s. Secretary, George W. Tillson, Room 12, cipal Building, Brooklyn, N. Y.

SOCIATION OF RAILWAY SUPERINTENDENTS OF GES AND BUILDINGS. Secretary, S. F. Pat-, Concord, N. H.

IERICAN RAILWAY ENGINEERING AND MAIN-NCE OF WAY ASSOCIATION. Secretary, L. C. h, 1562 Monadnock Block, Chicago.

IERICAN WATER-WORKS ASSOCIATION. Sec-y, J. M. Diven, Charleston, S. C. Annual ntion at West Baden, Ind., May 8 to 12.

ERICAN FOUNDRYMEN'S ASSOCIATION. Sec-y, Richard Moldenke, P. O. Box 432, New .

GINE BUILDERS' ASSOCIATION OF THE UNITED ES. Secretary, J. L. Lyle, 39 Cortlandt St., York.

STRUCTION OF VALPARAISO PORT WORKS.

ıder date of Jan. 25, 1905, the American tary of legation at Santiago, Chile, Edward low Ames, transmits the following trans- of the port works of Valparaiso, on the us project." The call for tenders was issued he Chilean Executive on Jan. 20, 1905.

T. 1. Public bids are asked for the con-tion of the improvements in the port of araiso, in conformity with the provisions w No. 1711 of Nov. 16 last, and with the ct, plans and specifications of the engineer, Jacob Kraus, in so far as the latter are not ntravention of the present decree.

.T. 2. The bids shall be made either for whole of the general and supplementary s indicated in the said project or only for general works. In the first case the bid- shall state separately the price at which will undertake to construct the general s, the estimate for which amounts to 28,567,- pesos ($10,427,032), exclusive of the cost propriations of property, and the price for upplementary works, the estimate for which 573,550 pesos ($1,669,346).

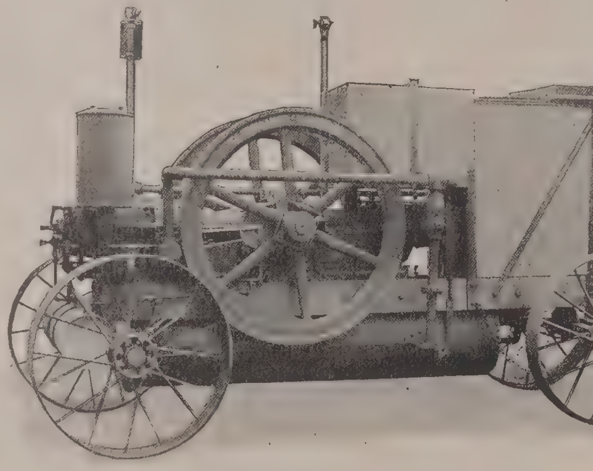
T. 3. For the supplementary works the rs shall state their prices per unit for the us works which are enumerated in the s project and which the Government may mine upon by virtue of the statement re- d to, modified in the ratio which the whole fixed by the bidders for the supplementary s in accordance with the preceding article bear the whole sum of 4,573,550 pesos pro- therefor by the official budget.

ART. 4. In conformity with article 13 of the statement of conditions (specifications) of the Kraus project, the Government shall undertake all proceedings relative to the expropriations which must be effected in carrying out the project, and shall pay for such expropriations with the funds authorized by the law of November 16, 1904.

ART. 5. The prices named in the tenders shall be stated in pounds sterling ($4.8665) or their equivalent in Chilean gold at 18 pence (36.6 cents) per peso.

ART. 6. Bidders may indicate at the time they present their bids, but in separate statements (sheets), modifications of detail which they may consider it expedient to make in the works as planned in the Kraus project, as well as in the manner of executing them. In that case they must accompany their tender with a statement justifying these modifications and the methods of executing them which they propose to adopt. Eventually they shall submit their explanatory calculations with reference to their modifications.

ART. 7. In accordance with the provisions of article 4 of the law of Nov. 16, no one shall be permitted to submit tenders unless he shall previously have deposited security equivalent to 2 per cent. of the amounts indicated in article 2 of this decree, with a voucher to that effect from the directory of the treasury, and unless he shall accompany his tender with a certificate to the effect that he has successfully executed maritime works of importance. These certificates must be legalized by diplomatic functionaries of the country abroad and by the minister of foreign affairs.



THE FAIRBANKS-MORSE PORTABLE AIR COMPRESSOR.

ART. 8. As regards payment of the works, the bidders shall express a preference, in accordance with article 2 of the law of Nov. 16, between the following methods:

(*a*) Cash payments (as the works proceed).

(*b*) Full payment on the completion of the works, and in this case there shall be paid 5 per cent. interest on the value of the works executed, calculated every six months.

(*c*) Concession of the exploitation of the works to the contractors, in which case the charges which they may collect in the future port shall not impose on ships and commerce a burden greater than at present. Said charges shall be fixed in conformity with article 8 of the law of Nov. 16, as the works which can be delivered for use are completed.

ART. 9. In case the contractor shall decide to be paid in cash, the security referred to in article 8 (should be article 7) shall, with the deposit provided for in article 44 of the list of conditions, constitute a guarantee fund. If the contractor shall prefer to be paid according to plan *b* or *c*, the security of 2 per cent. shall be returned to him when the value of the definite works completed by him shall have reached that sum, said works being valued according to the method prescribed in the list of conditions.

ART. 10. In case a tender based on either *b* or *c* form of payment be accepted, the modifications which it may necessitate in the list of conditions of the Kraus project shall be indicated at the time of signing the contract.

ART. 11. In conformity with article 12 of the list of conditions included in the data on which the contract is based, all materials, machinery and such other things as may be necessary for executing the works shall be exempt from customs duties.

ART. 12. The proposals shall be studied and reported on by a commission which shall be designated before the proposals are opened.

ART. 13. Within fifteen days after the acceptance of any of the proposals the contract shall be signed by the director of the treasury, on behalf of the Government, and by the authorized representative of the construction company.

ART. 14. The President of the Republic reserves to himself the right to reject all bids if he consider it expedient to do so.

ART. 15. Notices of call for bids will be published a year in advance in Santiago, Berlin, Brussels, London, Paris and New York. The bids shall be opened in the ministry of the treasury in Santiago, Chile, the first week day in April, 1906, at 2 P. M.

GASOLINE-DRIVEN AIR COMPRESSOR.

By J. A. Charter, M. E.

Since structural iron and steel are being so extensively used for almost every known purpose, there has been a considerable increase in the demand in these industries for portable air compressor outfits, easily carried from one location to another, and of sufficient capacity to operate several large pneumatic riveting hammers, air drills or chip hammers. As steam is expensive and inadequate for such purposes, Fairbanks, Morse & Co., have designed a portable gasoline-driven compressor outfit, as shown in cut herewith.

This consists of one of their standard, horizontal gasoline engines, special design, with an extended base in front of the crank shaft. Upon this extension is mounted the air cylinder, which is tandem with the power cylinder. The whole outfit is mounted on a steel truck, with steel wheels. Two water vessels are provided, one for cooling the engine cylinder and the other for cooling the air cylinder. The air receiver or storage tank is placed under the frame and the gasoline supply tank is hung at the end of the truck.

The supply tank carries sufficient fuel for two days continuous run. These machines are entirely self-contained, and automatic in every action. After the compressor is once started, it will run for several hours without any attention. An automatic regulator is attached to the air end, which maintains a constant pressure of 100 lb. in the air tank.

The engine is fitted with a regular centrifugal governor, which governs the fuel to the engine in direct proportion to the load; therefore when the air load is taken off the compressor, the engine is kept at a constant speed by the governor, and in this way fuel is consumed only in proportion to the work applied.

One of these machines, with standard outfit and pneumatic riveting tools, gives the constructor practically the same conditions in the field that can be obtained in the factory. A remarkable saving is reported from the chief engineer of one of our prominent railroads, who made a comparison between hand and pneumatic tool work on a bridge over the Mississippi River. All of the riveting and drilling work was done from a swinging stage under the bridge, making the work extremely difficult and hazardous. The holes to be drilled were 15-16-in. in diameter, and through 1 1-16-in. depth of metal. The rivets were ⅞-in. The expense for labor was as follows:

	Drilling holes.	Riveting.
Hand power	........19.23 cent.	.....6.82 cent.
Pneumatic tools	...... 1.92 cent.	.....2 cent.

There were in the neighborhood of 7,000 rivets driven on this work. The above report, practically illustrates the saving in labor realized from the use of this air compressor with rivet and drilling outfit, and it will be noted that the saving on a bridge of this size is about equal the cost of the entire outfit.

In addition to the saving in labor above mentioned, there was a considerable saving in time and men other than the drillers and riveters. Also, the work was finished in two months, whereas about six months would have been required to accomplish it by hand work. It is necessary to add that the time occupied in construction is frequently of great importance.

THE AIR RESISTANCE OF CAR BODIES.

The work which the Electric Railway Test Commission is now carrying on relates to the air resistance of car bodies and is likely to furnish such important data that a preliminary account of it is desirable. This commission, consisting of Messrs. J. G. White, H. H. Vreeland, J. H. McGraw, W. J. Wilgus and G. F. McCulloch, was appointed more than a year ago by President Francis of the Louisiana Purchase Exposition, in consultation with Prof. W. E. Goldsborough, chief of the Department of Electricity. Its previous work along many lines has been reported in the technical press in some detail, but little has been said regarding the special dynamometer car designed and constructed for the purpose of measuring directly the head and rear pressures and the side and roof resistances of car bodies. This car was recently completed at the shops of the Indiana Traction Co., at Anderson, Ind., this company having co-operated heartily in the rather tedious work incident to an experiment of this sort. The equipment for the car was secured partly by loan and partly by purchase of supplies through funds donated to the work by various electric and steam railway companies and by engineers interested in the investigation of important railway problems. The Indiana Traction Co., in addition to the facilities offered in its shops and offices, placed at the disposal of the commission a pair of high-speed Baldwin trucks and a set of four Westinghouse No. 85 motors, rated at 75-h.p. each. The Baldwin Locomotive Works made the changes in the center plates and side bearings of the trucks necessary to enable them to turn freely under the frame of a steel flat car loaned by the Pressed Steel Car Co. A motor-compressor of ample size, with governor and brake cylinder, was furnished by the National Electric Co., and the test corps designed and constructed the special brake rigging necessary to adapt these to the steel car frame. A powerful hand-brake rigging was also constructed, with Peacock brake drums supplied by the National Brake Co. Special bumpers were constructed to prevent damage to other cars in coupling, and heavy chains were used to prevent excessive motion of the car frame with respect to the trucks. As the frame was raised considerably above its usual height by the changes mentioned, this was considered desirable.

The dynamometer equipment, consisting of an interurban car body, 32 ft. long, without vestibules, rolls freely upon rails screwed to the flat car floor. This body, with a special steel vestibule and a standard vestibule, were supplied by the J. G. Brill Co. Under the side sills of the dynamometer body are mounted eight Chapman double-ball bearings, and these carry four axles of 3 7/16 in. diameter, 9 ft. long. Upon the axles are specially chilled wheels, 12 in. in diameter, with ground treads. The rails are also ground where they come into contact with the wheels. By this method of mounting there is, for practical purposes, no friction between the body and the flat car floor. The body is restrained from excessive motion by various effective safety devices. The pressure of the air upon the body is measured by means of scale beams, constructed for the tests by Fairbanks, Morse & Co. and loaned by them. The beams are supplied with dash pots, and the weighing mechanism consists of the regular beam with weights and poise, and, in addition, a spring balance with dial is employed to render easier the manipulation of the machine.

A successful plan has been carried out on this car for the purpose of separating the head and rear resistances from the total. The vestibule is independent of the body, but is carried therefrom by means of a link suspension. In order to guide the vestibule and to transmit the pressure to the weighing device, a steel-trussed oak frame, attached to the vestibule, projects into the car a distance of 8 ft., and it is guided on all sides by small Chapman bearings. This method of suspension has proved very satisfactory. In order to secure stability of the vestibule and body, each of these is held against the scales by counterweights, the forces of which are transmitted through bell cranks and levers, all equipped with knife-edge contacts.

In order to eliminate from the measurements all forces but those due to the air, the controllers are mounted on iron stands carried on the flat car floor and projecting into the car body, thus removing the effect of stiffness in the controller cables, a serious matter in a car of this size. Similarly, the trolley base is inside the car, carried upon the top of an oak post which projects upward from the flat car. No error is possible, therefore, from the resistance between the trolley wheel and line wire. While the forces mentioned are small in amount, the sensitiveness of the apparatus is such that the precautions taken are necessary.

The construction of the air resistance car was carried out by the test corps, which put in about three months in the actual detail work. This included the assembling of the equipment, the construction of the special brake rigging and other equipment, with the exception of the heavy steel and woodwork, which was done by outside parties from the funds of the commission. The corps also wired the car for a double-end controller arrangement, one controller of the Westinghouse L-4 type being loaned by the Traction Company, the other by the Westinghouse Electric & Mfg. Co., the latter also supplying a pair of circuit breakers and a large number of resistance grids for controlling the running speed of the cars.

The commission has realized the necessity of making exact measurements of all of the quantities involved in these tests, especially in regard to the matter of speed. For this purpose two independent plans are employed. The test track, somewhat over 25,000 ft. in length, is divided in sections of 1,000 ft. each. The sections are marked by large signs plainly numbered. The instant of passing each sign is indicated on the graphical record of a General Electric recording ammeter, which is also used for the current record. This ammeter records upon a strip of paper regular intervals of five seconds each. Upon this record is superimposed the time of passing each of the section signs, this being accomplished by closing a switch for an instant as each of these signs is passed. Thus the time of passing through a section of 1000 ft. is accurately recorded.

The second speed device consists of a small dynamo carried upon the truck frame and geared to the car axle by sprocket wheels and chain. This dynamo is an Apple igniter of the Dayton Electrical Mfg Co. It has permanently magnetized field poles, but these also carry exciting coils through which the field current of the recording ammeter is also passed. As this current must be maintained accurately at a value of 1 amp. for current measuring purposes, it is admirably adapted for the purpose mentioned. The electromotive force generated by the dynamo is read upon a Weston voltmeter specially arranged for this purpose. The electromotive force at 60 m.p.h. is about 7 volts. The readings are directly proportional to the speed. This apparatus has now been in operation for some weeks, and has demonstrated its accuracy and convenience.

In addition to the speed measurements, accurate readings at five-second intervals of motor electromotive force are recorded, and the current record is continuously checked by means of a direct-reading ammeter in the same circuit. The direction and velocity of the wind are also taken at frequent intervals, accurate anemometers having been supplied by Queen & Co. for the purpose.

The tests of the "Louisiana," as the air-resistance car has been named, will continue until sufficient data are at hand to determine the resistance to the motion of different shapes of car front at all speeds reached by modern interurban cars up to 70 m.p.h., this limit being set by the line and motor capacities. A speed of 72 m.p.h. has been reached for a short period.

BUSINESS NOTES.

The Mineral Point Zinc Co., Chicago, has ordered from Allis-Chalmers Co. a complete power equipment for its remodeled plant at Depue, Ill., consisting of two heavy-duty, cross-compound, 21 and 42x48-in. Reynolds-Corliss engines; two 500-kw. Bullock generators, to which the engines will be direct-connected; one 100-kw. generator, and 24 motors ranging in size from 10 to 75 h.p., with starters, rheostats, etc.

Contracts have been let by the Atchison, Topeka & Santa Fe Ry. for a tie-treating plant at Somerville, Tex., Allis-Chalmers Co. having the contract covering the construction of the cylinders, piping, and tanks; Fairbanks, Morse & Co., for the vacuum and pressure pumps; the Laidlaw-Dunn-Gordon Co., of Cincinnati, for the air compressors, and E. T. Colles & Co., of Chicago, for the feed-water heaters. There will be five cylinders, each 6 ft. 2 in. diameter by 132 ft. long on concrete foundations, with the necessary creosote tanks for storage and other purposes. The only treatment to be done will be that of creosote under the Rueping process, and the plant will have a capacity of 2,250,000 ties; 10,000,000 ft. of lumber, and 355,000 lin. ft. of piling per annum.

Richard Devens, who has for some years been connected with the European office of the Brown Hoisting Machinery Co., Cleveland, O., has been appointed manager of the New York office, 26 Cortlandt St., to succeed W. A. Stadelman, who has resigned.

The Thomas Moulding Co., Chicago, has ordered for its shops at New Straitsville, Ohio, a 22x42-in. Reynolds-Corliss horizontal, non-condensing, girder-frame engine; a 6x18-ft. horizontal tubular boiler designed for 125 lb. working pressure, a 150-h.p. open heater, and a 6x4x6-in. duplex boiler feed pump from the Allis-Chalmers Co.

The Suburban Engineering & Contracting Co., 29 Broadway, New York, recently incorporated with a capital of $100,000, will pursue a general engineering and contracting business, particularly with reference to water works, filtration systems, pipe lines, coal-handling plants, power development, concrete dams and reinforced concrete construction. The officers are: A. McD. Gray, president; George L. Schenck, secretary and treasurer; J. B. McCord, engineer and manager. Mr. Gray has been connected with the Tide Water Oil Co., Bayonne, N. J., and the Carteret Manufacturing Co., Carteret, N. J. Mr. Schenck has for many years been engaged in the designing and construction of special machinery. Mr. McCord has until recently been connected with the New York Continental Jewell Filtration Co., New York and Chicago, as engineer on the design and construction of filtration systems, waterworks and general contracting work.

The Miller-Collins Co. has just been formed by S. Fischer Miller and D. C. Newman Collins, for the purpose of doing a contracting and engineering business through the east and middle states. The company will make a specialty of industrial plants, engineering structures and buildings, steel-concrete, structural steel and masonry construction. Mr. Miller's extensive acquaintance in commercial and engineering circles, is the fruit of experience with Milliken Bros. and the American Bridge Co., of New York. As vice-president of the Tide-Water Building Co. he showed his ability as a manager, and developed early the method of lump-sum fee or profit to the contractor, plus cost of labor and materials. Mr. Collins had charge of the structural parts of the Betz Building and Odd Fellows' Hall in Philadelphia, the Lawyers' Title Building, New York Clearing House, Siegel-Cooper Building, Morgenthau Building, Heide Building, Commercial Cable and Dunn Buildings, in New York; St. George Hotel, Polhemus Memorial Clinic and Milliken Bros. industrial plant in Brooklyn. During the past four years Mr. Collins has devoted his time to a private consulting business at 29 Broadway, where he has designed and supervised the erection of the locomotive repair shops for the Lehigh Valley Railroad at Sayre, Pa., and the extensive additions to the plant for the Warren Foundry & Machine Co. at Phillipsburg, N. J. He laid out the entire new plant for the Pneumatic Signal Co. at Rochester, N. Y.; built the erecting shop for the De La Vergne Machine Co. in New York City, and the extensive plant for the Lidgerwood Mfg. Co. at Newark, N. J. The main office of the Miller-Collins Co. is located in the St. James Building, 1133 Broadway, and the downtown office is at 29 Broadway.

The Empire Engineering Corporation, New York City, has been incorporated with a capital of $1,000,000, to do a general engineering and contracting business. The directors are Edward D. Adams, Lindon W. Bates, Wm. Barclay Parsons, Alfred Skitt and Wm. S. Hulse, all of New York City.

The Taylor Construction Co., Cornwall-on-Hudson, N. Y., has been incorporated with a capital of $100,000. The company proposes to manufacture sand-lime bricks, concrete building blocks and to do general construction work at Freeport, L. I. The directors are John J. and Wm. R. Taylor and Clark J. Brown, Cornwall-on-Hudson.

The Tierney & Connelly Construction Co., Jersey City, N. J., has been incorporated, with a capital of $100,000, by Daniel F. Tierney, Jas. F. Connelly and Alex. J. Ross, all of Jersey City.

The H. W. Caldwell & Son Co., Western Ave. and 17th St., Chicago, has erected a 115 x 184-ft. foundry, with a 32 x 184-ft. gallery on one side and a charging and storage floor of the same size on the other side. The side aisles under these floors are served by small cranes and the main aisle, 50 ft. wide, is served by a 20-ton electric traveling crane with an auxiliary 5-ton hoist. For molding flywheels and other castings of large diameter there is a water-tight pit 10 ft. deep and 50 ft. in diameter. In a short time a Niles boring mill will be installed large enough to turn wheels 20 ft. in diameter and of 8-ft. face. This large increase in plant has been made necessary not only by the growth in the demand for large pulleys, band wheels, flywheels and rope sheaves, but also by the orders for the gears and power transmitting machinery which the company makes as the purchaser of this part of the business of the Walker Co.

The Frank S. DeRonde Co., New York, was erroneously stated in The Engineering Record of April 1, in an article on roofing in hot climates, to be the maker of Ruberoid roofing. This is incorrect, as the company is merely the export agent for this roofing and all other products made by the Standard Paint Co. in Mexico, Cuba, Porto Rico, Central and South America, China, Japan and the Philippine Islands.

The Economy blast hole loaders formerly made by Cope & Cornelius are now made by the Cyclone Drilling Machine Co., of Orrville, O. The company reports so many orders for these loaders and for the Cyclone contractors' drill and coal and well machines that it is running its shops overtime.

The executive offices of the American Steel Foundries will hereafter occupy the entire eleventh floor of 42 Broadway, New York. The output of their eight steel casting plants is so large that the company has found it necessary to introduce a new system of accounting and of distributing orders, so as to secure the greatest possible promptness in deliveries.

The Barr Pump Co., of Philadelphia, has been taken over by a new company known as the C. H. Wheeler Condenser & Pump Co., with which Mr. C. H. Wheeler, the former president and general manager of the Wheeler Condenser & Engineering Co., is now solely identified. The company will make surface, jet and barometric condensers; electric, geared and steam-driven vacuum and circulating pumps, water cooling towers, pumping engines and all auxiliaries for complete plants for both stationary and marine service, including the highest vacuum guarantees for turbine requirements. The company's principal office is in Philadelphia, at Lehigh Ave. and 18th St., with a New York branch at 26 Cortlandt St. Additional branches in Chicago and other large cities will soon be established. The officers of the company are the following: President, John Pitcairn, president of the Pittsburg Plate Glass Co., Pittsburg, Pa.; vice-president, George Burnham, Jr., of the Baldwin Locomotive Works; secretary and general manager, C. H. Wheeler; works manager, Otto W. Schaum, of Schaum & Uhlinger, Philadelphia; treasurer, W. H. Rometsch, of the Fletcher Works, Philadelphia.

The twenty-eighth annual catalogue of the American Road Machine Co., Kennett Square, Pa., is given to descriptions of the Champion road and street working machinery, contractors' tools and supplies, and rock crushers manufactured by the company.

The development of the Warren Bro Co., of Boston, has been very rapid, and at present time the capitalization is $500,00 20-year 5-percent. debenture bonds, $600,000 ferred stock and $2,000,000 common stock. terest on the bonds and 1½ per cent. quar dividends on the preferred stock have been regularly from the outset, and the common now pays 1 per cent. quarterly. The comp pavement was introduced in 1901, after years' laboratory work and private testing. 1,000,000 sq. yd. were laid in 1904, and company now has 32 complete plants for work.

The United Telpherage Co. has decide devote its organization and time to the d opment and exploitation of its system in various countries in which it has patents than to invest in an expensive plant for development of the manufacture. The D Coal Storage Co., appreciating the great of the telpherage system and the admirabl lution it presents of certain conveying probl has acquired from the United Telpherage exclusive rights to the manufacture and sal the United States. All current corresponde plans, drawings and patents are transferre the Dodge Coal Storage Co., and both parti the agreement are and will continue to ac hearty co-operative accord.

The Simplex Concrete Piling Co., Wasl ton, D. C., is now at work on the fou tions for a power-house, inspectors' buil and smokestack at the Union Terminal D Washington; for a market house in Baltin Md.; for a smokestack and large crane the Westinghouse Machine Co., and fo tower and several buildings for the Pittsl Plate Glass Co., Pittsburg, and for a po house stack for the U. S. Army at Wash ton, D. C. The work now in hand by company and by others operating under same patents is estimated to aggregate 400,000 lin. ft. of concrete piles.

Jenney, Mundie & Jensen, Chicago, have corporated, with a capital of $25,000, to d contracting and construction business. The corporators are Wm. B. Mundie, Elmer C. sen and Robt. G. Owen.

The works of the C. O. Bartlett & Snow of Cleveland, were seriously injured by fire April 11. The loss was greatest in patterns, the power plant and machinery were not serio injured. The machine shop and boiler shop running again, and there will be only slight d in filling orders, because of the courtesy of Ohio Ceramic Co., McMyler Mfg. Co., Bow Foundry Co., Cleveland Gas Light & Coke and others in offering the company the free of some of their tools.

The crusher sales of the Power & Mining chinery Co. since Jan. 1 include orders from Chicago Portland Cement Co., Barber Asph Paving Co., Illinois Stone Co., Callahan R Improvement Co. of Albany, Carroll Bros. Buffalo, Geneva Lake Gravel & Sand Co. Walworth, Wis., John O'Laughlin Stone Co. Racine, United States Jefferson Co. of Chica American Torpedo Sand Co. of Algonquin, Waukesha Stone & Lime Co. of Waukesha, J. A. C. O'Laughlin and Pugh Stone Co.

The Ohio River Construction Co., Evansvi Ind., has been incorporated with a capital st of $50,000. The company will dredge rivers a channels, improve harbors, build power da locks, hydraulic plants, telephone lines, etc. cob Eichel and R. J. Armstrong, directors

The Scarborough-Davis Co., Evansville, In has incorporated with a capital stock of $25,0 The company proposes to do a general contra ing business. Jas. Scarborough and C. H. Dav directors.

The Coffin Valve Co., Boston, Mass., has ju received a sub-contract through the T. A. G lespie Co. for all of the sluice gates for t new Pittsburg filtration plant. This contract especially notable, inasmuch as a large numb of the valves are to be electrically controlle The principal items consist of the followin 1 8-ft. 4-in.x6-ft. sluice gate, operated ball-bearing stands; 1 6-ft. 8-in.x6-ft. sluice ga operated by ball bearing stands; 4 6 ft x9 sluice gates, electrically controlled; 4 6-ft.x sluice gates, operated by ball-bearing stan 3 6-ft.x8-ft. sluice gates, electrically co trolled; 1 6-ft.x8-ft. sluice gate, operated ball-bearing stand; 5 6-ft.x7-ft. sluice gate electrically controlled; 46 5-ft. 3-in.x7-ft. slui gates, operated by hydraulic cylinders; 1 5-ft 6-ft. sluice gate, electrically controlled; 2 7 in., 4 60-in., 8 48-in., 2 30-in. and 7 24-in. ci cular sluice gates, operated by ball-bearing stan 4 48-in. check valves; 4 36-in. gate valve electrically controlled; 3 30-in. gate valves, ele trically controlled.

PERSONAL NOTES.

P. Harper has been elected city engi-
ine Bluff, Ark.

thur Reimer has been appointed super-
of the East Orange, N. J., water works.

ryce R. Blair has been re-elected city
of Carbondale, Pa.

rch P. Smith has been re-appointed city
of North Tonawanda, N. Y.

arvey Linton has been re-appointed city
of Altoona, Pa.

bert W. Hall has resigned as city engi-
lint, Mich., to accept a position with the
Bridge Co.

mes F. McCabe has been reappointed
neer of Topeka, Kan., for the fourth

F. Lawton has been re-appointed super-
of public works, and Mr. Wm. F. Wil-
y engineer of New Bedford, Mass.

mbrose Swasey has been elected presi-
he board of directors of the Cleveland,
ber of Commerce.

hn B. Hawley was recently re-appointed
neer of Ft. Worth, Tex., for the fifth
ve two-year term.

H. Thomson, city engineer, of Seattle,
as started on a trip to visit various
and European cities in order to study
of municipal economy.

bert J. Chambers has been appointed
lent and general manager of the Mont-
Light & Water Power Co., of Mont-
Ala.

L. Fry, engineer of maintenance of
he Southern Ry., with headquarters at
o, N. C., died suddenly at his home
3.

vid C. Rattray, assistant engineer, has
inted chief engineer of the Lancashire
ire Ry., succeeding Mr. W. B. Worth-
w chief engineer of the Midland Ry.

exander Kearney, superintendent of mo-
r of the Pittsburg Division of the Bal-
Ohio Ry., has resigned to accept a posi-
the Norfolk & Western Ry.

eph B. Hall has become Chicago mana-
Reeves Engine Co., of Trenton, N. J.
has had varied experience in machine
k, and as salesman for a number of
manufacturers.

E. Fleming, for a number of years
tive of the Nernst Lamp Co., in Chi-
become manager of the Nernst lamp
rtment of the Canadian Westinghouse
at Hamilton.

arles W. Williams, chief engineer of the
ruce mine in Minnesota, has been ap-
sistant to Mr. M. S. Hawkins, superin-
f the Iron Mountain and Stephens
hat state.

G. Read, president and general mana-
e Turbine Engineering Co., of New
Chicago, has been elected president of
n Electric Mfg. Co., of Sandusky, O.,
Mr. C. C. Warren, who died recently.

nley Dunkerley, for the last eight years
he department of applied mathematics
yal Naval College at Greenwich, has
inted professor of engineering at Man-
iversity.

M. Warren, electrical engineer of the
g department of the Delaware, Lacka-
Western R. R., has been promoted to
of electrical engineer of the entire
a system.

ineer of timber tests is wanted in the
Forestry, Department of Agriculture,
amination of candidates for the posi-
be given in various cities, May 17, by
Civil Service Commission.

P. Atwood, superintendent and engi-
aintenance of way on the Rio Grande,
dre & Pacific Ry., has resigned to be-
neer of maintenance of way on the
Peoria & St. Louis Ry., with headquar-
ringfield, Ill.

il Engineers' Society of St. Paul has
an engineering bureau to satisfy the
mand for engineers, particularly rail-
eers, in that vicinity. The work is
itously, and is under the direction of
Bernier, 394 North Exchange St., St.

ection of Mr. W. H. Hunter, chief
f the Manchester ship canal, as a mem-
board of advisory engineers of the
Canal Commission, was announced this
ir Mortimer Durand. The French and
overnments have not yet announced
tion of engineers for this board.

A Kansas City association of members of the American Society of Civil Engineers was formed recently, and the following officers elected: Mr. Daniel Bontecou, president; Mr. I. G. Hedrick, first vice-president; Mr. S. W. Fox, second vice-president; Mr. C. S. Burns, secretary and treasurer.

Mr. Benjamin Kauffman, recently representative of the Thomas Acme Air Purifying System Co., of Chicago, and formerly Cincinnati and St. Louis representative of the Paul System Co., is now associated with Evans, Almirall & Co., as assistant western manager, for the sale of their system of hot-water heating for central station and scattered buildings, with offices at 1057 Monadnock Block, Chicago.

The many friends of Mr. W. J. Clark, head of the foreign department of the General Electric Co., will be gratified to know that he has been appointed a delegate to the International Railway Congress, to represent the United States. While Mr. Clark was at the head of the railway department of the company he built up a wide circle of acquaintances, who will be glad to learn of the recognition given to his work in the railway field by the Government in making this appointment.

The Board of Direction of the American Society of Civil Engineers announced at the regular meeting, April 5, that the following candidates for admission to the Society had been elected: As Member.—James A. Davenport, Engr. in charge double tracking, Norfolk & Western Ry., Roanoke, Va. William A. Doble, Pres. Abner Doble Co., San Francisco, Cal. James E. Garrett, with Compania Minera de Naica, S. A., Naica, Chihuahua, Mexico. Wm. E. Gunn, City Engineer, Covington, Ky. Joseph A. Norcross, Engr., New Haven Gas Light Co., New Haven, Conn. John S. Sewell, Capt., Corps of Engrs., U. S. A., Washington, D. C. As Associate Member.—Asher Atkinson, New Brunswick, N. J. Arthur H. Blanchard, Asst. Prof. Civ. Eng., Brown University; also Asst. Engr., State Board of Public Roads of Rhode Island, Providence, R. I. William W. Brush, Department of Water Supply, Gas and Electricity, Brooklyn, N. Y. Sidney K. Clapp, Asst. Engr., U. S. Geological Survey, Boston, Mass. Philip H. Dater, Asst. Engr., Western Div., Office of New York State Engr., and Surv., Rochester, N. Y. Edwin C. Finley, St. Louis, Mo. Frank L. Getman, Hudson, N. Y. John W. Goodridge, Asst. Engr., Rapid Transit R. R. Comrs., New York City. Jerome C. Herring, City Engr., Jefferson City, Mo. Bertram H. Hewett, Res. Engr., North River Div., Penn. R. R. tunnels, New York City. Caleb Hyatt, with Westinghouse, Church, Kerr & Co., New York City. Alexander H. Nelson, Engr. and member of firm, Nelson & Buchanan Co., Engrs. and Contrs., Pittsburg, Pa. Algernon S. Nye, Asst. Engr. with Aqueduct Comn., New York City. Shelby S. Roberts, Road Master, Main Stem, 1st Div., Louisville & Nashville R. R., Elizabethtown, Ky. **Rudolf V. Rose, Asst.** Engr., The Niagara Falls Power Co., Niagara Falls, N. Y. Robert W. Sayles, Prin. Asst. Engr. to Chas. W. Leavitt, Jr., New York City. Charles D. Searle, Asst. Engr., Rapid Transit Comn., New York City. Henry R. St. A. Walters, Prin. Asst. Engr. and Ch. Draftsman, The Gueber Engineering Co., Bethlehem, Pa. Eitaro Watanabe, with Imperial Taiwan Railways, Taipeh, Formosa, Japan. Gilbert C. White, Prin. Asst. Engr. to J. L. Ludlow, Winston-Salem, N. C. Clarence G. Wrentmore, Asst. Prof. Civ. Eng., Univ. of Michigan, Ann Arbor, Mich. As Associate.—Thomas F. Quilty, member of firm, John J. O'Heron & Co., Gen. Eng. Contractors, Chicago, Ill. Gilbert H. Scribner, Jr., Chicago, Ill. The following candidates were announced transferred, by the Board of Direction, from the grade of associate member to member: George E. Browning, Trichur, South India; Harrison W. Latta, Philadelphia, Pa.; Moses J. Look, Clinton, Mass.; James C. Meem, Brooklyn, N. Y.; Harry J. Morrison, Syracuse, N. Y.; John E. Ostrander, Amherst, Mass.; Clarence D. Pollock, Brooklyn, N. Y.; James W. Rickey, Minneapolis, Minn.; George A. Soper, New York City; Chas. F. Taylor, New York City. The following candidates as Junior were announced elected: Alfred H. Hartman, Elkton, Md.; Henry A. Campbell, Coyote, Cal.; Arden D. Doty, New York City; Richard K. Hale, Brookline, Mass.; Herbert W. Hatton, Wilmington, Del.; Donald W. Howes, New York City; Thomas B. Hunter, Monterey, Cal.; Walter E. Lydston, Auburn, N. Y.; John L. McConnell, Louisville, Ky.; James M. Owens, San Francisco, Cal.; David J. Shaw; New York City; Thomas P. Stevenson, Jr., Paramaribo, Dutch Guiana, S. America; William A. Treadwell, Albany, N. Y.; William F. Whitaker, Bakersfield, Cal.

CONTRACTING NEWS

OF SPECIAL INTEREST TO CONTRACTORS, BUILDERS, ENGINEERS AND MANUFACTURERS OF ENGINEERING AND BUILDING SUPPLIES.

WATER.

Notes Arranged Alphabetically by States.

Brighton, Ala.—The Brighton Water Works Co., of Brighton, is reported incorporated; capital, $10,000. Incorporators: J. A. Eastis, S. Stewart and J. H. Farr.

Birmingham, Ala.—Bids will be received May 14 by Julian Kendrick, City Engr., for constructing septic tanks and other improvements for valley and village creek trunk sewers.

Carbonhill, Ala.—See "Power Plants, Gas and Electricity."

Yuma, Ariz.—Press reports state that all bids opened on May 15 by the U. S. Reclamation Service at Los Angeles for the construction of the Laguna dam and sluiceways, for the diversion of a part of Colorado River about 10 miles northeast of Yuma, have been rejected. The lowest regular bid received for this work was submitted by P. McDonald, of Duluth, Minn., for $822,612. For detailed list of bids received for this work see issue of The Engineering Record, Mar. 25.

Wheatland, Cal.—R. N. Murphy, Town Clk., writes that the probable cost of proposed water works is $10,000. Engineer, J. R. Meeks.

Vallejo, Cal.—L. Kaarsberg, City Engr., writes that bids will be received, May 1st or 15th, for the extension of the water works. Plans and specifications have been completed. About 2158 tons of 14-in. c. i. water pipe will be used; total cost of work proposed, $106,500.

Wilmington, Del.—The Water Dept. is preparing plans for the extension and filtration of the water supply of this city. The new work, when complete, will include one 35 million gal. sedimentation or storage reservoir; 5 acres of slow sand filters; 8,000 ft. of 42-in. force main and 9,000 ft of 48-in. distributing main; two 12 million gal. vertical triple expansion pumping engines and a new pumping station. Theo. A. Leisen, Ch. Engr.

Wilmington, Del.—Bids will be received until May 1 by the Bd. Water Comrs. for supplying c. i. pipe and specials, as advertised in The Engineering Record.

Bids will be received until May 1 by the Bd. Water Comrs. for $200,000 water works bonds.

Washington, D. C.—See "Power Plants, Gas and Electricity."

Jackson, Ga.—See "Power Plants, Gas and Electricity."

Richland, Ga.—It is reported that J. A. Sims, Mayor, wants prices on pumps, air compressors, boilers, electrical supplies, pipes or mains and connections.

Nounan, Idaho.—The Skinner Irrigation Co., of Nounan, is reported incorporated, with a capital of $8,500 by John A. Skinner, Brigham Bacon, J. E. Crossley and others.

Chicago, Ill.—See "Power Plants, Gas and Electricity."

Chicago, Ill.—Bids will be received Apr. 26 by F. W. Blocki, Comrs. Pub. Wks., for furnishing material and constructing 2 shafts and a water pipe tunnel under North Branch of the Chicago River at Montrose Boule. Bids will also be received Apr. 25 for furnishing structural steel, etc., for a ventilator at the Central Park Ave. pumping station.

Brazil, Ind.—The question of constructing water works is reported to be under consideration here.

Elkhart, Ind.—The Elkhart Water Co. is reported to have decided to purchase an 8,000,000-gal. pump and make other improvements.

Shellsburg, Ia.—The citizens are reported to have voted to construct water works.

Cedar Rapids, Ia.—The Bd. of Water Comrs. is reported to have decided to ask City Council for an appropriation of $25,000 for the purpose of extensions, especially to be used for improvement of the fire protection in the business section of the city.

Sioux City, Ia.—It is stated that bids will be received until May 1 by the Trus. Water Wks. (G. B. Heally, Pres.) for laying approximately 7,400 ft. 12-in., 500 ft. 8-in. and 5,000 ft. 6-in. water pipe, together with specials, valves, hydrants, valve boxes and the replacing or restoring of all pavements cut to lay the pipe.

Humboldt, Kan.—All bids opened on Apr. 14 for constructing water works have been rejected, the bids received being too high. New bids will be received May 3, as advertised in The Engineering Record. Bids will be received on material separate from labor. Engineers Burns & McDonnell, 309 Dwight Bldg., Kansas City, Mo.

Thibodaux, La.—Bids are wanted for furnishing material and extending the water works system, comprising about 2,600 6-in. and 5,000 ft. 4-in. c. i. pipe, 16 two-way hydrants and a lot of special castings and valves. W. C. Ragan, Mayor.

Towson, Md.—The Clyburn Water Co. is reported incorporated with a capital of $12,000, by Thos. E. Robertson, Otto M. Mattfeldt, Saml. L. Ensor and others.

Boston, Mass.—Maj. John E. Baxter, Q. M., U. S. A., Boston, writes that the following are the bids opened Apr. 6: (*a*) submarine pipe line from Nut Island to Peddocks Island, Mass. (*b*) water works at Ft. Andrew (*c*) submarine and water works: C. A. Kenney, New York, N. Y., *a* $21,000 (if no rock is encountered) $24,500 (if rock is encountered); *b* $7,900; *c* $28,500 if no rock is encountered, and $32,000 if rock is encountered. John T. Cavanaugh, Quincy, *a* $22,000; *b* $15,000; *c* $35.000. John T. Langford, Boston, *a* $24,045; *b* $9,380. Smith & Robinson, New York, N. Y., *a* $24,989; *b* $10,242. Hiram W. Phillips, Quincy, $28,600. Ruggles & Perkins, Boston, *a* $29,736. Cefalo & Ferguson, Boston, *a* $29,989; *b* $11,789. Moore & Co., Boston, *a* $30,000; *b* $10,000. Townsend & Olsen, Boston, *a* $43,997. John Cashman, Quincy, *b* $8,500. Edw. B. Roberts, Swampscott, *b* $9,580. W. B. Byrne, Boston, *b* $9,700.

Webster, Mass.—At an expense of about $5000 the Bd. of Water Comrs. will soon replace the present 6-in. water main on E. Main St. with a 10-in. pipe. The distance to be covered will be about 3600 ft.

Lawrence, Mass.—A correspondent writes that the committee on water works has recommended to City Council the building of another sand filter from plans of Chapin & Knowles; estimated cost, $65,000. C. F. Lynch, Mayor; M. F. Collins, Supt. Water Wks.

**Gloucester, Mass.*—The Davis & Farnum Mfg. Co., of Waltham, is stated to have secured the contract on Apr. 13 for furnishing pipe and castings for $2,749.

Falmouth, Mass.—Bids will be received until May 1 by the Water Comrs. for reconstructing the stone foundation of the Quissett standpipe and painting the steel work. Louis E. Hawes, Engr.

Belding, Mich.—Bids will be received, May 5, by Wm. E. Fisher, City Clk., for $65,000 water works bonds.

Thief River Falls, Minn.—Bids will be received by Lars Backe, City Clk., May 1 for the construction of water works and a sewerage system comprising steel tower and steel tank distribution pipe line system, well, and sewerage system with septic tank. Oscar Claussen, Consulting Engr., St. Paul.

Fairmont, Minn.—See "Power Plants, Gas and Electricity."

Bagley, Minn.—Bids will be received by J. O. Sundet, Village Recorder, May 1 for the construction of water works to consist of a tower and tank, distribution pipe line system, frame building, deep well pump head and motor. Oscar Claussen, Consulting Engr., St. Paul.

Marshall, Minn.—See "Power Plants, Gas and Electricity."

Torah, Minn.—See "Power Plants, Gas and Electricity."

Duluth, Minn.—See "Power Plants, Gas and Electricity."

Clinton, Minn.—Bids will be received until May 1 by the Village Council for $6,000 water works bonds. F. W. Watkins, Recorder.

Humansville, Mo.—Bids are wanted Apr. 27 for furnishing material and constructing water works, including tower and tank. Engrs., Burns & McDonnell, Dwight Bldg., Kansas City, Mo.

Kansas City, Mo.—S. A. Mitchell, Resident Engr. Water Wks., has submitted to the Bd. of Pub. Wks. estimates of extensions of mains which are needed: In Swope Park, $22,500; on Linwood Boule., $40,000; in E. 15th St., $17.000; Sheffield St., $12,000, and for the 15th St. feeders, $40,000.

Alma, Neb.—A. A. Billings, City Clk., writes that bids for the construction of water works will probably not be received until some time in June. Water bonds to the amount of $15,000 were to have been sold Apr. 15.

Hardy, Neb.—The citizens are reported to have voted, Apr. 4, to issue bonds for the construction of water works.

Branchville, N. J.—See "Power Plants, Gas and Electricity."

New York, N. Y.—Bids will be received until May 3 by John T. Oakley, Comr. Water Supply, Gas and Electricity, for furnishing and delivering double and triple nozzle hydrants, lead-lined iron pipe, unions, elbows and couplings, in the Boroughs of Manhattan and Bronx.

Brooklyn, N. Y.—Bids will be received until May 3 by Martin W. Littleton, Pres. Brooklyn Boro., for furnishing material and constructing a sewer in a portion of Newkirk Ave. Engineer's estimate: 510 lin. ft. 30-in. reinforced concrete sewer, 270 ft. 24-in., 395 ft. 18-in., 1,215 ft. 15-in. and 1,100 ft. 12-in pipe sewer, 33 manholes, 26 catch basins 23 M. ft. foundation planking and 262 cu. yds. concrete cradle. Also for constructing a sewer in E. 31st St. Engineer's estimate: 45 lin. ft. 15-in. and 710 lin. ft. 12-in. pipe sewer, 8 manholes, 1 sewer basin, 4,800 ft. foundation planking and 54 cu. yds. concrete cradle.

Medina, N. Y.—Gov. Higgins is reported to have signed the bill permitting the Board of Trustees to expend $100,000 for the installation of water works.

**Items marked thus give the names of parties awarded contracts.*

West Point, N. Y.—Specifications can be seen at the office of the Engineering Record, 114 Liberty St., New York, for c. i. pipe and special castings, bids for which are to be opened May 5, as advertised in The Engineering Record.

Buffalo, N. Y.—Bids will be received Apr. 25 by the Dept. Pub. Wks. (Francis G. Ward, Comr.) for repairs and alterations of 6 boilers at the pumping station.

Plans for the improvement of Buffalo's water plant have been submitted to the Bd. of Aldermen, having been prepared by Albert Krause & Son. The engineers suggest that vertical pumps be substituted for the horizontal pumps now used at the pumping station and that 3 additional vertical pumps be installed.

Oneida, N. Y.—Engineer Tibbets is reported to have submitted to the Bd. of Pub. Wks. plans for a dam to be constructed across the gorge above the impounding reservoir. In one set of plans a dam of concrete is provided for, and it is estimated to cost about $17,000. An earthern embankment is projected in the other plans and the probable cost is estimated at about $18,000. Either dam would have a holding capacity of approximately 60,000,000 gal., and by putting on boards in the spillway the volume in storage could be increased to 75,000,000 gal. The engineer's estimates include gate chambers, but not the cost of the pipe line nor any miscellaneous and incidental expenses.

Scotia, N. Y.—Bids will be received May 1 by H. V. Mynderse, Village Pres., for $50.000 water bonds.

Ithaca, N. Y.—The Water Bd. is reported to have under consideration the construction of a new reservoir on South Hill.

Batavia, N. Y.—See "Sewerage and Sewage Disposal."

**Oakes, N. D.*—Mr. Kennedy, of Fargo, is reported to have secured the contract for constructing water works and a sewerage system at Oakes.

Minot, N. D.—The citizens are reported to have voted, Apr. 3, to issue bonds for water works and a sewerage system.

Williston, N. D.—See "Power Plants, Gas and Electricity."

Columbus, O.—Asst. Engr. John H. Gregory is reported to have announced that plans are about completed for the water purification and softening plant.

Reading, O.—The citizens are reported to have voted, Apr. 4, to issue $27,000 bonds for water works.

Norwalk, O.—It is stated that bids will be received until May 2 by the Bd. Pub. Service for furnishing and delivering a 100-hp. boiler for water works.

Cincinnati, O.—Bids will be received May 12 by the Bd. of Trus., Comrs. of Water Wks. (Aug. Hermann, Pres.) for laying 6, 7, 8, 10 and 12-in. c. i. pipe, special castings and valves and other miscellaneous work in connection therewith, as ordered to be laid by the Board, for the extension and betterment of the water distribution system.

**Geneva, O.*—Hewitt & Hann are reported to have secured the contract for extending the water system for $7,563.

Bellefontaine, O.—It is reported that about $10,000 will be expended this summer for extending the water mains.

Harrisburg, Ore.—See "Power Plants, Gas and Electricity."

McMinnville, Ore.—H. E. Maloney, City Recorder, writes that the citizens voted, Apr. 10, to secure a water supply by a gravity system. No engineer selected as yet.

Johnstown, Pa.—The Manufacturers' Water Co., of Johnstown, is reported to have in contemplation the construction of a dam on Quemahoning Creek.

Hughesville, Pa.—The Hughesville Home Water Co. is reported to have in contemplation extensive improvements to include rebuilding the reservoir, remodeling and repairing pumping station and installing new pumps. T. F. Bradinbaugh, Pres.

**Greensburg, Pa.*—The first contract to be awarded in Westmoreland County in connection with the building of pipe lines to transport water from Indian Creek watershed to Pittsburg and intermediate points on Pittsburg division of Pennsylvania R. R., is reported to have been awarded to Bennett & Talbot, of Greensburg. The contract is for the construction of a tunnel 2,600 ft. long under the tracks of the Hempfield branch near Greensburg. The tunnel will be 7 ft. in diam. It will be of brick laid in cement; contract price reported to be about $150,000. Property is reported to have been condemned in Springfield Township by the Mountain Water Co. for the construction of its reservoir.

Columbia, S. C.—At a meeting of the City Council Apr. 11 a petition was presented by a majority of the freeholders of Columbia for the issue of $400,000 bonds for new water works.

Chamberlain, S. D.—See "Schools."

Dresden, Tenn.—See "Power Plants, Gas and Electricity."

Bolivar, Tenn.—See "Power Plants, Gas and Electricity."

**Smithfield, Utah.*—The Wheelwright Constr. Co. is reported to have secured the contract for constructing water works here, to include 6 miles of pipe and a cement reservoir.

Springfield, Vt.—Water supply bonds to the amount of $150,000 are reported sold.

**Fredericksburg, Va.*—The contract for improving the city waterworks is stated to have been awarded to Cartright & Davis for $7,000.

Chewelah, Wash.—Engr. J. B. Thomas, of Colville, is reported to have submitted to Town Council a proposition to install water works. He will prepare a statement of the cost of a plant and present same to Council. The Council is reported to be in favor of municipal ownership of water works; if it is possible will issue bonds to install the system.

**Tacoma, Wash.*—The Tracy Eng. Co., of San Francisco, Cal., is stated to have secured the contract for 2 vertical triplex, double-acting pumps, to be installed at the South Tacoma Pumping Station, for $10,399.

Tacoma, Wash.—The Water Com. is reported to have decided to recommend to Council the employment of R. H. Thomson, City Engr., of Seattle, to make an expert examination of the proposed sources of water supply for Tacoma.

Kingwood, W. Va.—The Town Council is reported to have granted M. C. Talbott, of Philippi, a franchise for water works.

Prince Albert, N. W. Ter.—C. O. Davidson, City Secy., writes that Willis Chapman, 203 Bay St., Toronto, Ont., is preparing plans for water works and a sewerage system; probable cost $150,000.

Montrose, Colo.—Bids were opened on Apr. 1 for furnishing material and constructing a reservoir, pipe line, storage tank and distribut tem (Engr. in charge, John M. Roberts). The Chicago Bridge & Iron Co. bid only for storage tank complete for $2,567. The other bids were as follows: (*a*) P. J. Moran, Salt Lake City, Utah; (*b*) P. P. Ford, Denver, Colo.; (*c*) American Light & Water Co., Kansas City, American Light & Water Co., (taking bonds); (*e*) Holme & Allen Const. Co., Denver, Colo.; (*f*) Lotto Const. Co.; (*g*) A. F. Ross, Montr

Division 1. Wooden Stave Pipe.—Laid complete.	*a*	*b*	*c*	*d*	*e*	*f*
30,300 ft. 8-in., 100 ft. head	$0.64	$0.63	$0.53	$0.545	$0.525	$0.810
13,500 ft. 8-in., 150 ft. head	0.70	0.63	0.55	0.565	0.5725	0.82
12,400 ft. 8-in., 200 ft. head	0.75	0.64	0.59	0.605	0.6275	0.78
7,500 ft. 10-in., 100 ft. head	0.87	0.73	0.62	0.635	0.726	0.826
5,700 ft. 10-in., 150 ft. head	0.91	0.79	0.68	0.695	0.77	0.897
5,200 ft. 10-in., 200 ft. head	0.94	0.79	0.715	0.73	0.805	0.955
9 pressure reducers for 8-in pipe	276.00	200.00	402.50	415.00	200.00	225.00
1 pressure reducer for 10-in pipe	355.00	250.00	431.25	445.00	265.00	300.00
9 8-in. gate valves for 200 ft. head	29.00	32.00	23.00	24.00	33.00	39.00
1 10-in. gate valve for 200 ft. head	40.00	40.00	34.50	35.00	45.00	38.60
14 air and vacuum valves	53.00	5.00	7.50	7.75	35.00	10.00
14 2-in. drain valves	5.00	8.00	3.50	3.70	5.00	5.00
Total	$57,882	$51,994	$47,339	$48,594	$47,768 Amended to $46,390	$64,67[illegible]
Division 2.						
500 cu. yds. trench 5 ft. deep	$0.50	$0.50	$0.30	$0.31	$0.30	$0.335
500 cu. yds. trench 5 to 10 ft. deep	0.65	0.75	0.35	0.36	0.30	0.42
1,600 cu. yds. puddle	1.00	235.00	1.50	1.55	0.45	1.08
15,000 cu. yds. earth fill	0.40	0.50	0.30	0.305	0.25	0.215
300 cu. yds. riprap	2.30	2.50	2.50	2.55	2.50	2.00
Gate house complete	307.50	750.00	750.00	765.00	450.00	775.00
3 8-in. gate valves	29.00	32.00	23.00	24.00	33.00	30.00
300 ft. c. i. pipe, 8 in.	1.30	1.75	2.60	2.65	7.50	8.33
50 cu. yds. cement concrete 1:3:5	12.00	6.00	13.50	13.75	10.00	10.00
1 8-in. c. i. T	5.00	90.00	9.50	9.50	20.00	9.00
Total	$10,254	$14,396	$10,258	$10,484	$8,839	$10,763
Division 3.						
Storage tank complete	$2,100	$1,300	$1,906	$1,956	$1,760 Steel $2,970	$3,100
Division 4.						
10,000 ft. 4-in. pipe, 250 ft. head, laid	$0.50	$0.51	$0.34	$0.35	$0.35	$0.45
10 fire hydrants, set	0.55	45.00	36.80	37.50	44.00	43.00
5 4 in. gate valves to stand 250 ft. head	15.00	15.00	13.80	14.00	16.50	12.75
Total	$5,625	$5,625	$3,837	$3,945	$4,022	4,093
Grand total	$75,861	$73,315	$63,341	$64,980	$61,012	$83,532

Belle Fourche, S. D.—Raymond F. Walter, of Denver, Colo., Engr., U. S. Geological Survey, writes that the following are the bids opened 10 at this office for the construction of dam and regulator, canal, etc., for the purpose of diverting the flow of water of Belle Fourche Rive mile from the Belle Fourche and conducting same to a reservoir 6 miles from Belle Fourche. (*a*) S. R. H. Robinson, St. Louis, Mo.; Munn & Edward Hanschka, Deadwood, S. D.; (*c*) Carroll Contr. Co., St. Louis, Mo.; (*d*) Henry Wyttenbach, Sturgis, S. D.; (*e*) Constr. Co., Boise, Idaho; (*f*) Orman & Crook, Pueblo, Col.; (*g*) The Widell, Finley Co., Mankato, Minn.; (*h*) W. C. Bradbury, Denver. (*i*) Phalen & Shirley, Callahan Bros. & Katz, Omaha, Neb.; (*j*) Bates & Rogers Contr. Co., Chicago, Ill.; (*k*) Deeks & Deeks, St. Paul. (*l*) Winters, Parsons & Boomer, Spokane, Wash.; (*m*) Kilpatrick Bros. & Collins Contr. Co., Beatrice, Neb.; (*n*) Burrell Constr. Co., Cal.; (*o*) Keltie Contr. Co., Joliet, Ill.; (*p*) Knowlton & Bollen Constr. Co., Ft. Collins, Colo.; (*q*) Danl. J. Burke, Alliance, Neb.:

SCHEDULE NO. 1.—DIVERSION DAM, REGULATOR, SLUICE AND DROP COMPLETE.

	Concrete, 11,000 cu. yds.	Paving 18-in. thick 6,900 sq. yds.	Riprap 1,250 sq. yds.	C. I. gates, grooves, 56,000 lbs.	Pedestals; stems and screws, 14.	Structural steel, 46,200 lbs.	Sheet steel piling 22-in. long, 500 lin. ft.	Excav. foundation under water, 3,000 cu. yds.	Excav. foundation above water, 7,000 cu. yds.	Native lumber, 70 M ft.	Driving and pulling sheet piling 5-ft. deep, 1,500 lin. ft.
a	$4.95	$2.18	$2.50	$0.05	$70.00	$0.04¾	$26.00	$1.50	$0.30	$18.50	$0.30
b	4.95	2.70	2.50	.05	100.00	.055	23.00	1.50	.22	20.00	1.50
c	5.50	2.00	5.00	.08	150.00	.075	1.60	2.16	.44	32.00	1.10
d	5.65	1.75	1.28	.09	250.00	.075	24.00	1.25	.50	22.00	.60
e	4.50	3.25	2.35	.07	105.00	.07	34.65	2.50	.50	60.00	4.00
f	6.25	2.50	2.00	.09	75.00	.06	32.00	1.00	.25	35.00	1.25
g	6.75	2.75	2.95	.05	35.00	.055	28.00	1.50	.35	30.00	1.00
h	5.85	4.40	3.80	.07¼	104.00	.059*	23.00	1.75	.20	33.00	4.50
i	6.50	3.50	3.50	.09	265.00	.08	25.30	1.00	.30	35.00	2.50
j	7.45	2.75	2.00	.09	75.00	.09	27.50	.75	.60	40.00	4.80
k	7.30	2.50	2.50	.10	300.00	.08	52.80	2.50	.50	35.00	.60
l	7.50	2.70	2.25	.10	300.00	.08	52.80	2.00	.50	34.00	.50
m	8.91	3.21	2.97	.07	109.00	.09	26.24	2.00	.25	25.00	1.50
n	7.00	4.00	3.00	.05	350.00	.06	30.00	3.00	2.00	35.00	4.00
o	6.50	7.00	3.00	.08¾	325.00	.10	32.56	1.50	.60	25.00	1.00

SCHEDULE NO. 2. CANAL EXCAVATION AND EMBKMTS., INCLUDING EMBKMT. AT DIVERTING DAM AT BELLE FOURCHE.

	Excavation					
	Class 1, 800,000 cu. yds.	Class 2, 1,000 cu. yds.	Class 3, 1,000 cu. yds.	Class 4, 1,000 cu. yds.	Overhaul, 200,000 cu. yds.	Total.
g	$0.129	$0.25	$0.56	$1.25	$0.01	$107,260
p	.13¾	.35	.50	.95	.015	114,800
a	.14	.38	.60	1.00	.01	115,980
h	.155	.40	.40	1.20	.015	129,000
m	.155	.45	.45	.85	.02	129,750
d	.16	.32	.45	.90	.015	132,670
q	.15 15-16	.38	.39	.89	.02	133,160
f	.16	.30	.40	.85	.02	133,550
e	.16	.85	.95	1.25	.015	134,050
b	.17	.34	.45	.90	.015	140,690
l	.17	.40	.45	.90	.015	140,750
i	.18	.35	.45	.95	.015	148,750
k	.185	.60	.75	1.25	.015	153,600
c	.19	.45	.70	1.50	.015	157,650
j	.22	.50	.75	1.00	.03	184,250
o	.24	.50	.75	1.15	.02	198,400
n	.35	.70	1.50	1.70	.04	291,900

SEWERAGE AND SEWAGE DISP

Notes Arranged Alphabetically by

Bisbee, Ariz.—The Council is stated passed a resolution authorizing the to secure propositions for the constru a sewerage system.

Little Rock, Ark.—It is reported that inary orders for sewers aggregating $33, been sent to the Bd. of Pub. Wks. by Engr.

Bolinas, Cal.—The citizens are re have voted to issue bonds to improve tary system of the town.

San Francisco, Cal.—The Bd. of Pu has recommended the construction of H St., from 7th to 20th Aves., 424 cost of $14,000.

Sacramento, Cal.—Local press reports that plans and specifications are being pre by J. C. Pierson, City Engr., for the con tion of a new trunk line sewer to cost $80,0

Los Angeles, Cal.—The lowest bid opene Apr. 10 for constructing a storm sewer o St. from Main to Alameda St., was subm by W. H. Moffitt for $32,200.

Denver, Colo.—The Bd. of Pub. Wks. passed a resolution ordering the constructio a sewer in Highland Special Sanitary Dist. 8; estimated cost of this work is $30,4

**New London, Conn.*—The T. A. Scott is stated to have secured the contract for structing two outfall sewers in the Pequot tion, for $4,869.

Washington, D. C.—Bids will be received til May 17 by the Comrs., D. C., for const ing sewers in the Dist. of Columbia, as tised in The Engineering Record.

Idaho Falls, Idaho.—Bids will be received til May 12 by the Sewer Com. (A. V. S Chmn.) for furnishing material and constr ing a sewerage system in Local Sewerage prov. Dist. No. 1. Louis C. Kelsey, Engr., Lake City, Utah.

**Items marked thus give the names of parties awarded contracts.*

ville, Ind.—D. E. Dolen, Town Clk., at there is talk of constructing a sew-tem, but no action has been taken as

la, Ia.—Wm. H. Kimball, of Daven-naking surveys for the construction of ;e system at Indianola.

eavenworth, Kan.—Maj. D. E. McCar-M., U. S. A., writes that the contract ling a sewage lift at Ft. Leavenworth ened Apr. 3) has been awarded to Bros., 304 Shawnee St., Leavenworth,

ton, Ky.—Thos. A. Combs, Mayor, at he has been authorized by the Gen-ncil to employ a consulting engineer vise plans and specifications for the sewerage system, and has requested a e of five citizens to receive and review cations for this position. Engineers to submit a proposition will make ap-at once direct to John T. Shelby, Chmn. Com. The plans for the sewers are ompleted and the work of the engineer will be to go over these plans and ad-any changes, additions or alterations e made.

ille, Ky.—Mayor Grainger, City Engr. nd the Bd. of Pub. Wks. on Apr. 13 the question of approving the plans for truction of the big southern outfall hich is to extend from Floyd St. to er; estimated cost is $1,500,000. The do the construction work is not yet

boro, Md.—Wm. B. Massey writes that hler, of Denton, is engineer in charge ructing a sewerage system at Greens-

eadow, Mass.—The citizens are re-have voted Apr. 3 to extend the sewers uth end.

g, Mich.—The Council has ordered es-f cost of sewers in Jefferson, Seymour nut Sts., a total length of 2,590 ft., of 8, 15, 18 and 22-in. pipe and 20x30-shaped brick sewers. Probable cost H. A. Collar, City Engr.

on, Mich.—The Village Council is to be considering the question of the sewerage system.

polis, Minn.—Ellis R. Dutton, Asst. r., writes that the following are the ed on Mar. 31 for sewer material: castings, 200 tons (per ton), Eagle , Minneapolis, $55; Standard Fdry. Co., lis, $47.50; N. W. Fdry Co., Minneap-and Menzel & Jeffrey, Minneapolis,

pe: (*a*) Redwing Sewer Pipe Co., (*b*) Morison, Christenson Co. (price given pipe and "Ys" and slants ea.): Pipe—o cts., *b* 9½ cts.; 9 in. *a* 16½ cts., *b* 2 in. *a* 30 cts., *b* 31 cts.; 15 in. *a* 42 ½ cts.; 18 in., *a* 60 cts., *b* 61 cts.; 24 , *b* $1.27;—Ys—6x9 *a* 66 cts., *b* 68 cts.; 1.50, *b* $1.55; 6x15 *a* $2.10, *b* $2.17; 3.00, *b* $3.05; 6x24 *a* $5.00, *b* $5.08; 1.30, *b* $1.33; 15 *a* $1.82, *b* $1.85; 18 *b* $2.58; 24 *a* $4.16 and 6 slants *a* 30 cts.

l, Minn.—City Engr. L. W. Rundlett the cost of a main sewer on Atwater Rice to Gaultier St., at $20,000. ill be received until Apr. 27 by the Wks. (R. L. Gorman, Clk.) for con-a sewer in a portion of Arch and W. .

River Falls, Minn.—See "Water."

is, Mo.—Local press reports state that be received until May 2 by the Bd. rov. (Waller Edwards, Secy) for con-the following sewers: Sewers in Fill-Sewer Dist. No. 4, estimated cost, Prairie Ave. Sewer Dist. No. 8, esti-st, $6,500; Tower Grove Sewer Dist. timated cost, $8,600; Dist. No. 2, esti-st, $27,800; Manchester Road Sewer , 2, estimated cost, $26,000; Gravois er Dist. No. 2, estimated cost, $20,500; er Road Sewer Dist. No. 3, estimated 500; Manchester Ave. sewer, estimated 800; 17th St. sewer, estimated cost, 3th St. sewer, estimated cost, $30,000; ewer inlets and connections, estimated oo; Taylor Ave. sewer, estimated cost,

ood, Mo.—T. J. Byrnes, of St. Louis, ed the contract for constructing a pub-istrict sewer system (bids opened Apr.),000. E. J. Hanley Co., of St. Louis, at the same time the contract for 3 aks to purify the sanitary sewage of

seph, Mo.—Geo. F. Barnes, Clk. Bd. s., writes that the following are the ed on Apr. 5 for the construction of) Sycamore St. sewer, (*b*) Grand Ave.) Mitchell Ave. sewer, (*d*) South St. wer: (1) reinforced concrete, (2) con-brick, (4) reinforced concrete block: nery, St. Joseph, (*a*4) $7,443 (awarded (*b*2) $24,269, (*c*2) $55,667 (awarded Rackliffe & Gibson, St. Joseph, 040, (*a*3) $11,745, (*a*4) $9,080, (*b*1) (awarded contract), (*b*2) $24,558, ,080, (*c*1) $52,700, (*c*2) $56,527, 500, (*d*1) $96,763 (awarded contract), 06,431, (*d*3) $121,519; Hanley & Topeka, Kan. (*a*2) $11,950, (*a*4) *b*2) $38,160, (*b*4) $40,310, (*c*2) $100,-$169,373; John Mahoney, (*a*2) $11,-$14,443, (*b*2) $28,310, (*b*3) $35,580, 847, (*c*3) $81,540, (*d*2) $139,684, (*d*3) G. O. Skilbred, St. Joseph, (*a*2) $10,-$19,575, (*b*2 and 3) $32,205; Wm, Land, St. Joseph (*a*2) $8,745, (*b*2) $28,100, (*c*2) $64,755, (*d*2) $462,000; Gibson & Simpson, St. Joseph (*b*2) $27,781, (*b*3) $32,705.

Westfield, N. J.—Bids will be received by the Town Council May 1 for constructing about 3,600 lin. ft. of 8-in. sanitary sewers, with house connections and appurtenances in portions of Elm St., Boulevard, Lawrence and Summit Aves. Lloyd Thompson, Town Clk.; H. C. Van Emburgh, Engr., 149 North Ave, Plainfield.

Haddonfield, N. J.—The Boro. Council is reported to have approved the plans of W. W. Young for a sewerage system in West Haddonfield.

New York, N. Y.—Bids will be received Apr. 26 by John F. Ahearn, Boro. Pres., for furnishing material for alterations and improvements to sewers and appurtenances in portions of W. 69th St. and W. 157th St. Engineer's estimate: 781 lin. ft. brick sewer, 3 ft. 6 in. x 2 ft. 4 in.; 322 lin. ft. 15-in. salt-glazed vitr. stoneware pipe sewer; 15 lin. ft. 12-in. salt-glazed vitr. stoneware pipe culvert; 900 cu. yds. rock to be excavated and removed, etc.

White Plains, N. Y.—The State Senate is reported to have passed the Bronx sewer bill.

Rochester, N. Y.—The Bd. of Aldermen has adopted ordinances providing for the construction of sewers in Federal, Sidney, Quincy, Arch and Kingston Sts., at a cost of $20,000.

Rye, N. Y.—The Bd. of Health is reported to have decided to submit a proposition to Council for an improvement of the sewerage system.

Batavia, N. Y.—Plans are reported in progress by the Sewer Comrs. to take up the matter of preparing new plans for a sewer system in Batavia. It is the opinion of the Comrs. that the matter of obtaining a supply of pure water for the village might properly be considered in connection with the sewer proposition, and they will suggest to the Bd. of Aldermen the immediate appointment of a pure water commission.

Ballston Spa, N. Y.—A bill is about to be introduced in State Legislature authorizing this village to issue $150,000 bonds for the completion of the sewerage system and building a sewage disposal plant.

Wellsville, N. Y.—See "Paving and Roadmaking."

Bismark, N. D.—Engineer Crabbe, of Fargo, is reported to have completed and presented to Council plans for a sewerage system.

Minot, N. D.—See "Water."

Ellendale, N. D.—V. E. Haskins, City Aud., writes that the citizens voted, Apr. 3, to issue $8,000 bonds for constructing a sewer on Railroad Ave., and bids for constructing same will be received Apr. 24, at 7.30 P. M. Engineer, D. C. Washburn, of Aberdeen.

Oakes, N. D.—See "Water."

**Columbus, O.*—Julian Griggs, Ch. Engr. Bd. Pub. Service, writes that C. T. McCracken & Co., of Cleveland, have secured the contract for constructing Section "A" of the Central Relief Sewer (bids opened Mar. 29) at the following detailed bid:

Brick sewer:

1595 lin. ft. 117-in. sewer	$24.90
499 lin. ft. 114-in. sewer	24.60
1123 lin. ft. 108-in. sewer	21.10
568 lin. ft. 81-in. sewer	11.90
200 lin. ft. 7x15-ft. sewer	43.90
20 lin. ft. 24-in. IR sewer	2.40
180 lin. ft. 15-in. drain	1.25
3080 lin. ft. repaving	2.30
380 lin. ft. 6-in. gas pipe	2.00
1150 lin. ft. 3-in. gas pipe	1.00
400 lin. ft. Ry. track	1.25
60 penstocks	2.50
6 catch basins	40.00
11 manholes	90.00
30 cu. yds. No. 1 concrete	7.00
250 cu. yds. No. 2 concrete	5.00
50 protectors	2.00
6220 cu. yds. flushed	.28
19,000 cu. yds. rammed	.49
Fire Cist., Chestnut and High	1200.00
Manhole, Pearl and Chestnut	490.00
Manhole, Third and Chestnut	580.00
Manhole, Naghten and 5th	520.00
Manhole, Naghten and 4th	300.00
Credit for material	250.00
Total	$117,744

Toledo, O.—The lowest bid opened on Apr. 15 by the Bd. of Pub. Service for a sewer in Belmont Ave. and Hoag St., was submitted by Wm. J. McMahon for $8,494.

Columbus, O.—The Council, on Apr. 10, repassed the $18,000 southeast sanitary sewer bond ordinance over the Mayor's veto; it also passed the ordinance appropriating $17,000 for the south side main sanitary sewer.

Cincinnati, O.—Local press reports state that the work of surveying the Mill Creek sewer, which will be the largest sewer of the city, has been completed by Engineer Meeks and his assistants, under supervision of the City Engr.

*The contract for constructing a sewer in Beech and Oak Sts., 1st, 2d and 3d Aves., and Liberty St. is reported to have been awarded on Apr. 14 to Thos. P. Strack, 518 Walnut St., for $23,177.

Berea, O.—Bids will be received May 8 by the Village Council for furnishing materials and constructing a drain in West St. Bids will be received on same date for $3,000 bonds to pay for the above work. O. R. Stone, Village Clk.

Martins Ferry, O.—Bids will be received Apr. 29 by the Bd. Pub. Service (E. D. Lash, Secy) for constructing a 30-in. sewer in a portion of Zane St.

**Blackwell, Okla. Ter.*—The contract for constructing a sewerage system (bids opened Apr. 14) has been awarded to Phelps & Nesbit, of Dexter, Ia. Engineers, Burns & McDonnell, Kansas City, Mo.

**Pittsburg, Pa.*—Contracts for constructing sewers, bids opened Apr. 5, have been awarded as follows: To F. Dinlus Bros. for 4,753 ft. 15 and 18-in. pipe, $6,894; Jacob Mensinger, 562 2d Ave., for 5,124 ft. 15, 18 and 24-in sewer, $9,843, and to Ott Bros., 414 Washington Ave., for 995 ft. 36-in brick sewer and 904 ft. 9, 10, 12, 15 and 24-in. pipe sewer, $7,085.

It is stated that bids will be received May 1 by the Schenley Farms Co. for improving a portion of its property in the 14th Ward, requiring about 26,000 ft. of terra-cotta sewer pipe, 6x24 in. H. T. Douglas, Jr., Ch. Engr., 4203 5th Ave.

Altoona, Pa.—Harvey Linton, City Engr., writes the new sewers contemplated for Millville will cost about $15,000 and consist of 8 to 15-in. vitrified clay pipe.

Mt. Carmel, Pa.—Bids will be received until May 4 by the Boro. Council for constructing a system of sewers, as advertised in The Engineering Record.

Middleburg, Pa.—H. M. Wiest, of Freeburg, is stated to have petitioned Council for a franchise for a sewerage system.

Chamberlain, S. D.—See "Schools."

San Antonio, Tex.—City Engr. John D. Rullman writes that the estimated cost of the sewerage system for the Laurel Heights Dist. is $23,500.

Logan, Utah.—The question of constructing a sewerage system is reported under consideration here.

Kenosha, Wis.—It is reported that contracts will soon be let by City Council for a sewerage system in the western part of the city.

**Renfrew, Ont.*—J. K. Rochester, Town Clk., writes that the Canadian Sewer Pipe Co. has secured the contract for sewer work (bids opened Apr. 10) as follows: 4500 ft. 6-in. tile at 11¼ cts.; and 3000 ft. 8-in. tile at 18½ cts., f. o. b. Renfrew; 6-in. junctions, 65 cts .ea., 3-ft. lengths, and 8-in. junctions, $1 ea., 3-ft. lengths.

Galt, Ont.—It is stated that bids will be received until May 1 for constructing 7 miles of sewer and 4 miles of storm drains. J. McCartney, Town Clk.

Berlin, Ont.—It is stated that bids will be received, Apr. 25, for grading about 14 acres of sewage filter beds, the laying of force mains, sewage carriers and effluent chains, and the construction of distributing chambers, valve chambers, etc. J. F. Honsberger, M.D., Chmn. Bd. Sewerage Comrs.; Davis & Johnston, Engrs., Economical Blk.

Prince Albert, N. W. Ter.—See "Water."

BRIDGES.

Notes Arranged Alphabetically by States.

Los Angeles, Cal.—Harry F. Stafford, City Engr., writes that it is proposed to construct a plate girder bridge in the near future at 7th St., to be paid for jointly by the city and the Ry. Co.

New Haven, Conn.—The following bids are stated to have been received Apr. 10 for constructing a bridge and approaches on Kimberly Ave., over northeasterly branch of West River: Russell Contr. Co., of New York, N. Y., $19,890; C. W. Blakeslee & Sons, of New Haven, $25,285, and Fred. E. Ley, of Springfield, Mass., $26,887.

**Atlanta, Ga.*—The contract for completing Edgewood Ave. Bridge, bids opened Apr. 3, is stated to have been awarded to the Southern Ferro Concrete Co., for $27,155.

Tipton, Ind.—It is stated that bids will be received until May 1 by the Co. Comrs. for constructing stone or concrete arches in Wildcat Township. T. W. Longfellow, Co. Aud.

Plymouth, Ind.—It is reported bids are wanted May 2 for constructing an iron bridge 80 ft. long. H. L. Singrey, Co. Aud.

New York, N. Y.—The following are the bids opened on Apr. 11 by Geo. R. Best, Comr. of Bridges, for construction of the University Heights Bridge and approaches over the Harlem River at 207th St., Manhattan Boro. to 184th St., Bronx Boro.; (*a*) R. H. Hood, 220 Broadway; (*b*) Williams Eng. & Constr. Co., 21 Park Row; (*c*) United Eng. & Constr. Co., 21 Park Row; (*d*) Snare & Triest Co., 39 Court St.; (*e*) J. C. Rodgers, 1909 Amsterdam Ave.; (*f*) Naughton & Co., 258 Broadway; (*g*) Jos. Gallo, 127 Mulberry St.

	a	*b*	*c*	*d*	*e*	*f*	*g*
24,400 cu. yds. dredging	$1.75	$0.25	$1.60	$0.40	$0.40	$0.40	$0.50
663,000 ft. sheet piling	85.00	65.00	40.00	40.00	60.00	41.00	35.00
200,000 lin. ft. piles	.50	.25	.30	.20	.40	.35	.25
60.000 ft. grillage	50.00	28.00	20.00	30.00	25.00	35.00	30.00
12,000 cu. yds. broken stone or riprap	1.60	1.05	1.00	.50	1.50	.60	.90
10,000 cu. yds. earth excavation below high water	3.00	1.50	1.00	2.00	2.00	.80	1.00
20,000 cu. yds. earth excavation above high water	.75	.70	.30	.60	.50	.70	.50
95,000 cu. yds. filling	.35	.15	.50	.25	.30	.25	.30
122,000 cu. ft. cribwork	.10	.20	.06	.10	.07	.08	.30
33,600 cu. yds. concrete	7.00	5.00	6.50	6.00	5.00	5.90	7.00
4,600 cu. yds. finished concrete	8.00	6.00	8.00	6.00	10.00	6.80	9.00
400 cu. yds. limestone masonry	25.00	9.00	12.50	12.50	10.00	15.00	20.00
2,700 cu. yds. granite ashlar masonry	27.00	21.00	24.00	35.00	22.00	27.00	24.00
9,200 cu. ft. granite coping	2.00	2.00	2.50	3.00	2.00	3.15	3.00
1,080 cu. ft. granite caps and bases	3.00	2.50	2.35	3.00	2.00	2.35	2.50
2,900 cu. ft. granite bridge seats and pedestal blocks	2.00	1.50	2.00	3.00	1.75	1.85	2.00
354,000 lbs. steel and iron, erected and painted	.05	.045	.0385	.046	.04	.05	.04
1,230 lin. ft. ornamental railing, erected and painted	8.00	7.25	6.00	4.00	8.00	7.70	5.00
1,341 lin. ft. pipe railing, erected and painted	5.00	4.25	3.80	1.00	3.75	4.15	5.00
1,200 lin. ft. vitrified pipe conduits	.60	.65	.10	1.00	.20	.75	3.00
1,050 lin. ft. iron pipe conduits	.60	.50	.20	.25	.40	.25	1.00
2,500 cu. ft. concrete steel	.80	.38	.50	.50	.60	.50	.50
2,281 sq. yds. asphalt pavement removed from old spans	.60	.20	.10	.30	.60	.20	.25
2,800 sq. yds. asphalt pavement laid	2.15	2.00	2.00	1.00	2.00	2.25	2.00
8,650 sq. yds. Medina sandstone pavement laid	2.75	2.85	2.50	1.50	2.40	2.80	2.50
10,650 sq. yds. Telford-McAdam pavement laid	1.50	1.45	1.00	1.00	1.20	1.50	1.35
1,800 sq. yds. paved gutters	2.50	2.85	.30	.50	1.66	1.25	1.00
1,200 lin. ft. 12-inch vitrified pipe	1.75	3.50	.65	.50	1.00	1.50	.80
20,500 sq. ft. cement sidewalk	.22	.22	.05	.07	.10	.09	.15
12,500 sq. ft. new bluestone flagging	.30	.30	.25	.20	.25	.30	.28
2,200 lin. ft. granite curbing	1.50	1.75	1.30	1.00	1.25	1.75	2.00
890 lin. ft. new bluestone curbing	1.25	1.00	.90	.50	.75	1.00	.80
8,700 sq. ft. old flag. relaid	.15	.08	.03	.10	.05	.05	.05
2,120 lin. ft. old curbing relaid	.50	.06	.10	.20	.10	.10	.10
1,400 sq. ft. crosswalks	1.25	.65	.80	.70	1.00	.65	.75
1,000 lin. ft. brick sewer	5.00	10.00	7.00	4.50	5.00	8.00	8.00
5 new sewer basins, complete	200.00	100.00	125.00	150.00	150.00	150.00	100.00
6 new sewer manholes, complete	150.00	100.00	60.00	50.00	60.00	100.00	100.00
5 old basin heads, reset	75.00	10.00	15.00	20.00	10.00	50.00	25.00
11 old manhole heads, reset	40.00	10.00	5.00	5.00	5.00	50.00	20.00
100 cu. yds. brickwork	15.00	14.00	15.00	10.00	12.00	20.00	2.00
2 shelter houses, complete	4000.00	2500.00	1580.00	1500.00	2500.00	3500.00	3000.00
4 canopies, complete	1000.00	1500.00	850.00	500.00	2000.00	990.00	800.00
4 pairs of gates, complete	60.00	150.00	100.00	50.00	200.00	288.00	100.00
Removing buildings	1000.00	100.00	1.00	10.00	10.00	100.00	300.00
Furnishing and maintaining engineer's office and boat	4000.00	1000.00	1000.00	300.00	1000.00	2500.00	500.00
Total	$809,829	$609,697	$638,567	$595,898	$633,519	$641,889	$671,002

**Items marked thus give the names of parties awarded contracts.*

Des Moines, Ia.—It is stated that the Chicago, Great Western R. R. Co. (Saml. Stickney, Gen. Mgr., St. Paul, Minn.) will expend $300,000 for the construction of bridges along its lines between Des Moines and Kansas City.

Lenoxdale, Mass.—It is stated that bids will soon be received for constructing a steel bridge at Lenoxdale at a probable cost of $5,000.

**Springfield, Mass.*—The contract for constructing superstructure of bridge over Connecticut River between Chicopee and West Springfield is stated to have been awarded (bids opened Apr. 8) to R. F. Hawkins, of Springfield, for $43,749.

Lyons, Mich.—The citizens are reported to have voted to issue $12,000 bonds to construct a bridge over Maple River.

Elk River, Minn.—The contract for constructing a bridge over Mississippi River is stated to have been awarded to W. T. Chadbourne, of Elk River, for $21,950 (bids opened Apr. 7).

Duluth, Minn.—See "Power Plants, Gas and Electricity."

Jackson, Miss.—L. D. Lott, City Clk., writes that it is proposed to construct a bridge over Town Creek on Rankin St.; probable cost, $5,000.

Neligh, Neb.—It is reported bids are wanted Apr. 28 for constructing 2 steel bridges in Antelope Co. M. W. Murphy, Chmn. Bridge Com.

Jersey City, N. J.—Bids will be received until Apr. 27 by the Bd. Boule. Comrs. (Walter O'Mara, Clk.), for repairing the Boule. Bridge across Morris Canal and bridge over the tracks of the Newark & N. Y. R. R.; Boule. Bridge over Erie R. R. tracks between 16th and 19th Sts., and Boule. Bridge at Highwood Park, both in Weehawken Township, and for improving the approaches to the viaduct and to Highwood Park, at Weehawken.

Bids will be received until May 4 by the Bd. Chosen Freeholders (John P. Egan, Clk.) for constructing a highway bridge over Bowers St. at Ogden Ave.

Newark, N. J.—The Joint Bridge Com., of Essex and Hudson Freeholders are stated to have adopted plans and specifications for the bridge to be constructed over Passaic River at Delevan Ave. The steel and stone structure to be 445 ft. long with a 40-ft. roadway and foot walks on either side 7½ ft. wide, to be paved with creosoted blocks, tracks are to be laid for the street railway.

**New York, N. Y.*—The following are the bids opened on Apr. 11 by Geo. E. Best. Com. of Bridges, for the partial reconstruction of westerly or Manhattan terminal of the Brooklyn Bridge; Snare & Triest Co., 39 Cortlandt St., $102,600 (awarded contract), and Northeastern Const. Co., 23d St. and B'way, $145,000.

New York, N. Y.—See "Paving and Roadmaking."

Pembina, N. D.—Bids will be received by the Co. Comrs. until May 10 for furnishing material and constructing 8 steel bridges. Swain Thorwaldson, Co. Aud.

Cleveland, O.—Bids will be received, May 17, by the Bd. Co. Comrs. (Julius C. Dorn, Clk.) for the construction of masonry abutments for a steel bridge in Solon Township. Wm. H. Evers, Engr., 237 The Arcade.

It is stated that bids will be received until May 10 by the Co. Comrs. (Julius C. Dorn, Clk.) for constructing stone bridges.

Bryan, O.—It is stated that bids will be received May 4 by Geo. E. Morris, Co. Aud., for constructing substructure and superstructure of 6 bridges and substructure of 3 bridges.

Columbus, O.—Bids will be received by L. E. Jones, Co. Aud., until May 8 for $20,000 bridge bonds.

Norwalk, O.—Bids will be received May 2 by the Bd. Pub. Service (T. B. Kellog, Clk., Whittlesy Blk.) for furnishing material and constructing a bridge at South West St.

Oregon City, Ore.—It is stated that a bridge will be constructed over Clackamas River at a cost of $11,000.

**Providence, R. I.*—The Tiverton Bridge Comrs. are stated to have awarded the contract for constructing the Tiverton Bridge to Augustus Smith, of New York, N. Y., for $52,000. The contract for the approaches to Beattie & Wilcox, of Fall River, Mass., for about $100,000.

Olivet, S. D.—Bids will be received, May 8, by J. W. Wipf, Co. Aud., for constructing 8 steeel bridges.

Milwaukee, Wis.—The Park Bd. is stated to have opened the following bids Apr. 13 for constructing a bridge in Lake Park: F. W. Sivyer, $12,708; D. B. Danielson, $6,292, and the Newton Engineering Co., $6,246.

Bamberg, Ont.—It is stated that bids will be received until May 1 by Fred. Walters, Comr. for constructing 2 cement abutments, about 300 cu. yds. for steel superstructure.

PAVING AND ROADMAKING.

Notes Arranged Alphabetically by States.

San Francisco, Cal.—The Bd. of Pub. Wks. has recommended the repaving of Mission St., 2,600 ft., at a cost of $38,000.

Denver, Colo.—The Bd. of Public Wks. is stated to have authorized the City Engr. to prepare plans and specifications for paving with concrete 12 alleys between York and Gilpin Sts. and 14th and 16th Aves., probable cost of improvement, $20,000.

**Jacksonville, Fla.*—Philip Prioleau, City Engr., writes that the contract for furnishing material, grading and laying 43,730 sq. yds. of gravel on several streets was on Apr. 10 awarded to Geo. R. Foster, Jr., of Jacksonville.

**Jacksonville, Fla.*—The Bd. of Pub. Wks. is stated to have awarded to Geo. R. Foster, Jr., the contract for paving with cement gravel an area of 43,780 sq. yds. at 65 cts. per sq. yd.

East St. Louis, Ill.—Bids will be received, Apr. 29, by the Bd. Local Improv. (Mayor Silas Cook, Pres.) for improving a portion of Second St., requiring 9746 sq. yds. vitr. brick pavt.; 5008 lin. ft. combination curb. and gutter; 870 ft. 10-in., 2030 ft. 12-in., and 1980 ft. 15-in. vitr. pipe. W. J. Crocker, City Engr.

**Salem, Ill.*—The contract for paving the principal thoroughfare here is stated to have been awarded to Foulkes & Forbes Constr. Co. of Terre Haute, Ind., for about $40,000.

Chicago, Ill.—Bids will be received Apr. 26 by the Bd. Local Improv. (And. M. Lynch, Pres.), for paving with vitrified brick asphalt and granite on portions of numerous streets.

Wilmette, Ill.—Bids will be received Apr. 25, by the Bd. Local Improv. (Henry B. Gates, Chmn.) for improving by grading and paving with macadam a portion of Washington Ave. C. N. Roberts, Engr., Rm. 709, Reaper Blk., Chicago.

Peru, Ind.—It is reported that bids are wanted May 9 by the Co. Comrs. for constructing 9½ miles of gravel roads.

**Michigan City, Ind.*—The following are the bids opened on Apr. 3 for paving 3 streets with brick: (*a*) Michigan St., to consist of 10,500 sq. yds. paving, 4,320 lin. ft. curb and 4,400 cu. yds. grading; (*b*) 10th St., for 9,600 sq. yds. paving, 5,400 lin. ft. curb and 5,000 cu. yd. grading, and (*c*) 8th St., 3,000 sq. yds. paving, 2,300 lin. ft. curb, and 1,650 cu. yds. grading (bids were submitted on different classes of brick): E. A. Freshwater & Sons, New Cumberland, W. Va., *a* (8 bids) $16,909 to 18,274, *b* $16,336 to $17,584, *c* $6,421 to $6,928. C. D. Fry & Co., Greenfield, Ind., *a* (5 bids) $16,165 to $16,532, *b* $16,338 to $10,818, *c*, $6,393 to $6,471. Fred Hoffman, Rochester, Ind., *a* (7 bids) $18,240 to $18,985, *b* $17,388 to $18,060, *c* $6,992 to $7,265. Hoertz Constr. Co., Grand Rapids, Mich., *a* (3 bids) $19,843 to $20,893, *b* $20,078 to $21,038, *c* $7,980 to $8,370. A. Schneider & Co., Michigan City, *a* (9 bids) $18,613 to $19,030, *b* $17,414 to $18,758, *c* $7,025 to $7,571. W. W. Hatch & Sons, Goshen, *a* (13 bids) $17,355 to $18,825, *b* $15,916 to $17,260, *c* $6,218 to $6,764. Bowlin & Hines, Frankfort, *a* (9 bids) $18,863 to $20,543, *b* $18,244 to $19,780, *c* $7,251 to $7,875. D. L. Gaskill, Hammond, *a* (5 bids) $18,497 to $19,547, *b* $17,756 to $18,620, *c* $7,576 to $7,927. Wm. S. Hadley, Canton, O., *a* $16,521, *b* $16,444, *c* $6,363. W. W. Hatch & Sons, of Goshen, secured the contract for a total of $25,000.

South Bend, Ind.—Bids are wanted Apr. 25 for about 60,000 sq. yds. brick paving. A. J. Hammond, City Engr.

The City Council has passed a resolution providing for the paving of Main and Jefferson Sts. with asphalt.

**Rensselaer, Ind.*—Jas. N. Leatherman, Co. Aud., writes that Glidewell & Son, of Greencastle, have secured the contract for constructing about 13½ miles of gravel roads in Jasper County (bids opened Apr. 17) for $19,170.

Cedar Rapids, Ia.—The following bids are stated to have been received by the Public Improv. Com. on Apr. 11 for improving portions of A and B Ave. and 2d St.: *a* Purington repressed block, *b* cement curbing, *c* extra curbing, *d* extra macadam, *e* grading: J. J. Snouffer, Jr., *a* $1.30, *b* 40 cts., *d* $2.00, *e* 15 cts.; C. L. Besler, *a* $1.45, Oskaloosa block $1.40, *b* 30 cts., *d* $2, *e* 24 cts.; Jackson Constr. Co., *a* $1.45½, *b* 34½ cts., *d* $1.25, *e* 26 cts.; M. Ford, *a* $1.44, *b* 32 cts., *d* $1.40, *e* 22 cts. The probable cost of the improvement is $35,000.

Owensboro, Ky.—E. B. Shifley, City Engr., writes that bids will be received about June 1 for paving, to cost from $30,000 to $50,000.

Paducah, Ky.—Bids will be received by the Bd. Pub. Wks. (S. A. Fowler, Secy.) for reconstructing a portion of 3d and Broad Sts., bids to be submitted on Purington block, manufactured at Galesburg, Ill.; Warren's bitulithic pavement and sheet asphalt. Approximate estimates of quantities are as follows: Excav., 13,296 cu. yds.; paving, 28,650 sq. yds.; stone curb., 2,232 lin. ft.; cement curb., 10,400 lin. ft., and 1,000 lin. ft. c. i. soil drain pipe. Address L. A. Washington, City Engr.

Shreveport, La.—It is stated that about $27,000 will be expended in paving. Andrew Querbes, Mayor.

New Orleans, La.—The Finance Com. is stated to have decided to reject all bids received Apr. 3 for paving with asphalt portions of Dryades, Barome, Prytania and Poydras Sts.

The following bids are stated to have been received for repairing asphalt streets throughout the city: Louisiana Improvement Co., Hennen Bldg., bid $148,500 for the first year and $35,000 each year for the 2 succeeding years; the Barber Asphalt Paving Co., Hennen Bldg., bid $1.21 per sq. yd. for repairs of asphalt surface.

**Worcester, Mass.*—The Webb Granite & Constr. Co., Crescent St., is stated to have received the contract for furnishing paving blocks, curbs, etc., as follows: 35,000 ft. straight curbstone at 53 cts. per ft.; 2,000 ft. circular curb at $1.10 per ft., 200 ft. circular corners at $3.50 each, and 12,000 sq. yds. paving blocks, etc., at $1.45 per sq. yd.

Holyoke, Mass.—Bids will be received by the Bd. of Pub. Wks. May 5 for furnishing composition, exclusive of coal tar, for use in the construction of tar concrete sidewalks during 1905; also same date for about 3,000 sq. yds. vitrified brick, prepared wooden blocks or asphalt blocks, and on same date for about 12,000 sq. yds. of paving, all three advertised in The Engineering Record.

Minneapolis, Minn.—Ellis R. Dutton, Asst. City Engr., writes that the following are the bids opened on Mar. 31 for paving material:

(*a*) brick, 30,000 sq. yds., Cleveland Brick Co., Cleveland, O. (blocks), 99 cts.; Alex Van Hafton, Minneapolis (brick), 95 cts., (blocks), $1.0701; Metropolitan Pressed Brick Co., Canton, O. (blocks), .984 cts.; Purington Pressed Brick Co., Galesburg, Ill. (blocks) 98 cts.; Indiana Pressed Brick & Blk. Co., Indianapolis, Ind. (blocks) .9765 cts.

Cedar blocks, 10,000 sq. yds. (per sq. yd.): Alex. W. Van Hafton, Minneapolis, 49 cts.; Dumas Backus Lbr. Co., Minneapolis, 60 cts.; F. M. Barnard, Minneapolis, 62½ cts.; Leaf Lbr. Co., Feeley, Minn., 48½ cts.; Page & Hill Co., Minneapolis, 60 cts.

Sandstone block, 30,000 sq. yds.: Kettle River Quarries Co., Minneapolis, $1.48 per sq. yd.

Crushed slate, 1,000 cu. yds.: Asa Paine, Minneapolis, $2.75 per cu. yd.

Crushed granite: Western Granite Constructing Co., St. Cloud, Minn., $2.29 per cu. yd.

Curb, 5,000 lin. ft. granite (per lin. ft.) (*a*) straight, (*b*) radius: Western Granite Constr. Co., St. Cloud, Minn., *a* 69½ cts., *b* 79½ cts.; Robt. Graham, St. Claud, Minn., *a* 65 cts., *b* 75 cts.; Kettle River Quarries Co., Minneapolis, *a* 66 cts.; *b* 76 cts.

Sandstone curb, 10,000 lin. ft.: Kettle River Quarries Co., Minneapolis, 5x18 in. 44 and 54 cts.; 5x20 in., 46 and 56 cts.; 6x20 in., 55 and 65 cts.

The Council has ordered curbing and guttering for 1905, at a cost of $25,000.

St. Paul, Minn.—Bids will be received by the Bd. State Capitol Comrs. (Channing Seabury, vice-pres.) until May 2 for furnishing materials and constructing stone, brick or asphalt roadways, also cement sidewalks for the new State Capitol bldg. Plans and specifications may be obtained from Cass Gilbert, Archt., 524 Endicott Bldg., on a deposit of $100.

Newark, N. J.—Engr. Ernest Adam is stated to have estimated the cost of laying out a street from Broad St. to Springfield Ave. above Shipman St., at $600,000. The plan provides for a roadway 1,820 ft. long and 80 ft. wide.

**New York, N. Y.*—D. G. Pecora, 407 E. 114th St., has secured the contract for laying artificial stone pavements and constructing private sewer and drains at School No. 34, Bronx Boro. (bids opened Apr. 17), for $7,757. The Murray Contr. Co. secured the contract for building steps and walls and laying artificial stone pavement at School No. 31, Bronx Boro., for $4,650.

Bids will be received until May 11 by Geo. E. Best, Comr. of Bridges, for furnishing material and making repairs to asphalt pavements on bridges over the Harlem River in the Boro. of Manhattan, during the year 1905.

Brooklyn, N. Y.—Bids will be received until May 3 by Martin W. Littleton, Pres. Brooklyn Boro., for furnishing material, regulating and repaving with asphalt on portions of 6 streets, with asphalt block on portions of 3 streets, and with granite on a portion of Tillary St., and for constructing cement concrete sidewalks on portions of numerous streets. Engineer's estimate of the quantities is as follows: 8,940 cu. yds. concrete, 29,890 lin. ft. curb., 995 lin. ft. br. gutters, 32,230 sq. yds. asphalt pavt., 15,410 sq. yds. asphalt block pavt., 5,620 sq. yds. granite pavt., and 101,225 sq. ft. sidewalks.

**Brooklyn, N. Y.*—The following are opened on Apr. 12 by Martin W. L Pres. Brooklyn Boro. for regulating, curbing, guttering and laying sidewalks ster Ave. from Coney Island Ave. to end Ave. (bidders of Brooklyn, unles wise mentioned): John M. Fox, $17,60 Gallagher, $16,143; M. F. Hickey, Seaboard Constr. Co., $15,214; Norton man, $17,442; Wilson & Baillie Co., $14 M. Culp, $14,222; Union Constr. Co., Rockefeller Bros., $14,289; Mangieri Co City, $15,458.65; Fred'k Lück, 1522 Ave., Brooklyn, $13,741 (awarded c Daniel Douglass, $16,632, and Frank M. $14,956. The detail bid of Fred Lück, cessful bidder, is as follows: 1,260 sq. y gutters, on a concrete found., $2; 5, ft. new curb., set in concrete, $1.15; 4 yds. earth excav., 50 cts.; 26,252 sq. ft. sidewalks, 8 cts., and 1,230 sq. ft. ne stone bridging, 14 cts.

*The following are the bids opened 12 by Martin W. Littleton, Pres. Boro., for regulating and repaving with on a concrete foundation (*a*) Kent Av Myrtle to Flushing Ave.; (*b*) 39th St. Ave. to Old City Line Ave. (bidders of lyn, unless otherwise mentioned): O'Grad *a* $19,620; Cunningham & Kerns, *a* $1 $34,888; Seabord Constr. Co., *a* $21,484, 432; Norton & Gorman, *a* $19,694, *b* Jas. Quinn, Jr., N. Y. City, *a* $19,440, *b* (awarded contract; Chapman & Ryan, *a* Brooklyn Alcatraz Co., *a* $19,090, *b* George & Farrell, 576 Douglass St., B *a* $18,486 (awarded contract), *b* $34,509 Hickley, *b* $41,360.

New Brighton, S. I., N. Y.—Bids wil ceived Apr. 25 by Geo. Cromwell, Pres Richmond, for repairing and guttering crete and sand foundations, portions of Pl., Richmond Terrace, Vanderbilt Ave. St. and Broadway. Engineer's estimate sq. yds. granite blk., laid with paving joints; 5,100 sq. yds. vitr. brick; 2,500 asphalt blk.; 4,510 lin. ft. new curb., 1,360 lin. ft. new curb., 16-in.; 950 c concrete, etc.

*Jos. Johnston's Sons, of West New B have secured the contract for paving H Ave. and Hyatt St. (bids opened Apr. $2.68 per sq. yd. for 3,830 sq. yds. block; 70 cts. per sq. ft. for 1,230 sq. bridgestone and 95 cts. per lin. ft. for 2, ft. 20-in. curb; total cost, $13,061. Th bids received for the work were: M. Fit 312 W. 141st St., N. Y. City, $13,564; J Donovan, Port Richmond, $14,516, and Matthews, 13 Park Row, N. Y. City, $13.

*The following are the bids opened Crowell, Pres. Richmond Boro., Apr. repaving with granite block Richmond T John E. Donovan, Port Richmond, $27,3 Fitzgerald, 312 W. 141st St., N. Y., (awarded contract); E. A. Matthews, City, $28,097, and Jos. Johnson's Sons, New Brighton, $28,295. The detail bid Fitzgerald, the successful bidder, is as f 8,350 sq. yds. granite block, $2.85; 1,100 bridgestone, 75 cts; 3,300 lin. ft. new cu and 6 cu. yds. steel concrete, $15 per cu.

*Bids were opened same time and pla asphalt block pavt. (*a*) New York Ave., clude 5,400 sq. yds. asphalt block, 840 c concrete, and 2,200 lin. ft. 16-in. curb Richmond Ave., 8,100 sq. yds. asphalt 1,250 cu. yds. concrete and 3,400 lin. ft. curb: Continental Asphalt Paving Co., City, *a* $16,860, *b* $25,067; Hasting Pav. Y. City, *a* $15,490, *b* $23,262; Barber Paving Co., N. Y. City *a* $13,856 (a contract), *b* $20,984 (awarded contract); Donovan, Port Richmond, *b* $25,247.

*Bids were opened same time and pla paving Broad St. with brick: The Russell Co., N. Y. City, $12,193; John E. Do Port Richmond, $13,139; Michael Fitzgera Y. City, $12,248.50; E. A. Matthews, City, $12,302, and Jos. Johnson's Sons, New Brighton, who were awarded contr the following detail bid: 3,850 sq. yds. $1.92; 500 cu. yds. concrete, $4.50; 1,3 ft. 20-in. curb, 95 cts.; 2 cu. yds. brickwor and 40 sq. yds. 3-in. flag, 30 cts.; total, $

Brooklyn, N. Y.—The following are the bids opened on Apr. 12 by Martin W. Littleton, Brooklyn Boro., for asphalt paving. (*a*) Barber A. P. Co., 114 Liberty St., N. Y. City; (*b*) Co., 1 B'way, N. Y. City; (*c*) Cranford Co., 52 9th St., Brooklyn; (*d*) B'klyn Alcatraz Co. St. and Gowanus Canal, B'klyn:

**11th St., from 3d Ave. to Prospect Park W.*

	a	**b*	*c*	
14,430 sq. yds. asphalt pavt.	$0.84	$0.75	$0.95	
14,430 sq. yds. old stone pavt.	.33	.30	.20	
8,160 lin. ft. new curb	.82	.75	.85	
430 lin. ft. old curb, reset	.30	.30	.30	
36 noiseless covers and heads	15.00	15.00	15.00	
Total	$24,243	$21,940	$24,199	$

**Sumner Ave., Hopkins St. and Sumner Pl.*

	**a*	*c*	*b*	
10,100 sq. yds. asphalt pavt	$1.10	$1.35	$1.10	
60 sq. yds. adjacent pavt	.33	.35	.30	
1,790 cu. yds. concrete	4.18	5.25	4.75	
6,900 lin. ft. new curb	.82	.85	.75	
710 lin. ft. old curb, reset	.30	.30	.30	
8 noiseless covers and heads	15.00	15.00	15.00	
...	$24,603	$29,251	$25,138	$

**Brooklyn, N. Y.*—The following are the bids opened on Apr. 12 by Martin W. Littleton, Pres. Brooklyn Boro., for regulating and re with granite block on a concrete foundation Dwight St., from Beard to Columbia St. (bidders of Brooklyn, unless otherwise mentioned). F. Hickey; (*b*) Seaboard Construction Co.; (*c*) W. J. Fitzgerald, N. Y. City; (*d*) George & Farrell; (*e*) Cunningham & Kearns, N. Y. City Brooklyn Alcatraz Co.; (*g*) Chapman & Ryan; (*h*) Norton & Gorman; (*i*) Jas. Quinn, Jr., 1483 Ave. A, N. Y. City (awarded contract); J. Gallagher:

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	**i*
9,200 sq. yds. granite block pavt., with tar and gravel joints	$2.39	$2.80	$2.58	$2.44	$2.48	$2.40	$2.45	$2.40	$2.38
50 sq. yds. adjacent pavt.	.40	.34	.10	.20	.15	.25	.15	.20	.20
1,800 cu. yds. concrete	5.00	4.49	4.00	4.10	3.90	4.50	4.40	4.50	4.19
1,580 lin. ft. new curb	.60	.89	.85	.76	.85	.80	.80	.90	.84
3,100 lin. ft. old curb., reset	.30	.24	.23	.26	.25	.25	.35	.30	.28
2,280 sq. ft. new granite bridging	.80	.84	.80	.63	.65	.65	.75	.70	.60
1,000 sq. ft. old bridging relaid	.10	.24	.15	.14	.20	.10	.15	.20	.15
Total	$34,810	$38,164	$34,971	$33,421	$33,643	$33,813	$34,676	$34,338	$33,161

**Items marked thus give the names of parties awarded contracts.*

ng Island City, L. I., N. Y.—Bids will be
ved May 1 by Jos. Cassidy, Pres. Boro.
ns, for regulating, grading, curbing and
g portions of numerous streets. Engineer's
ate: 54,920 sq. yds. vitr. fire-clay brick or
pavt.; 3,600 sq. yds. asphalt, including
r course; 108,850 sq. ft. new flagstones;
sq. ft. cement flagstones; 113,650 sq. ft.
it sidewalk; 41,600 lin. ft. concrete curb;
o lin. ft. new concrete curb, furnished and
8,300 lin. ft. blue stone curbstone, fur-
d and set; 7,510 sq. ft. new bluestone
ing; 30,400 sq. yds. earth excav., etc.

st Point, N. Y.—Bids will be received,
27, by the Quartermaster, U. S. M. A.,
furnishing and delivering 1 steam road
here.

chester, N. Y.—The Bd. of Aldermen is
l to have passed ordinances for construct-
ement walks on a portion of Lake Ave.,
cost of $7,000 and paving a portion of
er St. at an estimated cost of $11,000.

nira, N. Y.—The Bd. of Pub. Wks. has
red its intention of repaving Maple Ave.
each, City Engr.

yracuse, N. Y.—F. T. Pierson, Clk. Bd.
ract & Supply, writes that the contract for
g Wood St. with sheet asphalt (bids opened
3) has been awarded to the Central City
g Co., of Syracuse, for $8,777.

llsville, N. Y.—Bids will be received un-
ay 9 by F. M. Leonard, City Clk., for pav-
n S. Main St., approximately 11,000 sq.
paving and 4,300 lin. ft. curbing; also for
hing and laying 1,000 ft. 18-in. and 300 ft.
pipe; also constructing and furnishing ma-
by cu. yd. for a concrete arch culvert,
5-ft. in length as advertised in The En-
ring Record.

veland, O.—Bids will be received, May 13,
e Bd. Co. Comrs. (Julius C. Dorn, Clk.)
mproving Bedford Road. Wm. H. Evers,
, 237 The Arcade.

aware, O.—Bids will be received by the
Comrs. (E. S. Mendenhall, Engr.) until
8 for constructing about 10 miles of roads,
May 9 for constructing about 13 miles of
, and until May 10 for constructing about
es of roads throughout the county.

uthers, O.—Bids will be received, May 17,
ndrew R. Black, Village Clk., for $3,000
improvement bonds.

disonville, O.—Bids will be received, May
y J. A. Conant, Village Clk., for $7.500
repair bonds.

rwood, O.—Bids will be received May 13
e Bd. Pub. Service (E. R. Edwards, Clk.),
rnishing material and improving a portion
urtland Ave., by grading, curbing and pav-
ith macadam. J. A. Stewart, City Engr.,
813, Traction Bldg., Cincinnati.

ncinnati, O.—The following are the bids
d on Apr. 14 by the Bd. of Pub. Service
aving a portion of Vine St. with about
sq. yds. granite, 1,400 cu. yds. concrete,
lin. ft. curb, etc.: Wm. Heffron Constr.
Neave Bldg., $32,383 (awarded contract);
el & Sullivan, $33,111; J. A. Eberhart,
9; Quill & Poos, $33,318, and Kirchner
Co., $32,541.

nton, O.—About $75,000 will be expended
ummer on brick paving.

eubenville, O.—Robt. S. McConnell is
to have received the contract for con-
ing the Smithfield Gap Pike, for $3,913.

veland, O.—Bids will be received, May 6,
e Bd. Co. Comrs., (Julius C. Dorn, Clk.),
rading, draining and paving a portion of
f Road in Brooklyn and Independence
ships. Wm. H. Evers, Engr., 237 Arcade

cinnati, O.—Bids will be received by the
ub. Service (Geo. F. Holmes, Clk.), until
10, for furnishing material and improving
ion of Washington Ave., by grading, curb-
nd paving with bitulithic pavement.

on, O.—It is stated that bids will be re-
by the Bd. Pub. Service (Chas. H. Wat-
Secy.) until May 4, for grading, curbing
aving with brick on a portion of Arch St.

st Cleveland, O.—H. B. Chapman, Vil-
Clk., writes that the contract for paving
brick on portions of several streets (bids
l Apr. 15) has been awarded to Baldwin
& Graham, Citizens Bldg., Cleveland.

do, O.—Bids will be received Apr. 25 by
d. Pub. Service (Harry S. Jones, Secy.)
proving portions of Jackson, Horton and
o Sts., by paving with either vitrified
asphalt block, sheet asphalt, Medina
stone, creosoted wood blocks, bithulithic
ent or other bituminous macadam.

ling Green, O.—The County Coms. are
to have awarded on Apr. 10 contracts
lows: Macadamizing Stebel Road in Web-
ownship to Geo. E. Mercer, at $1.14 per
r stone; Foos and Carter Roads in Center
hip to Ryan & Co., of Maumee, for $1.19
1.39 per yd. respectively.

ladelphia, Pa.—Thos. Cunningham, 1211
on St., is stated to have received the con-
for paving and repairing streets with
e blocks, his bid ranging from $2.68 to
per sq. yd. for paving, and $2.67 to $2.94
pairing. The improvement to cost about
o.

burg, Pa.—It is stated that bids are
l May 1 by the Schenley Farms Co. for
ing a portion of its property in the 14th
Approximate quantities: 400,000 cu. yds.
g, 19,000 sq. yds. asphalt paving, 20,000
s. brick paving, 24,000 lin. ft. curbing,
3,200 sq. yds. cement or flag sidewalks.
Douglas, Jr., Engr., 4203 Fifth Ave.

**Pittsburg, Pa.*—Contracts for paving (bids opened Apr. 5) have been awarded as follows: J. B. Sheets & Co., 317 London St., 9252 ft. sandstone curb. and 12,983 cu. yds. excav., $11,034; Booth & Flinn Co., Ltd., 1942 Forbes St., 1520 ft. sandstone curb. and 34,381 cu. yds. excav., $12,952, and for 8,500 sq. yds. block stone, 2,750 sq. ft. granite crossing and 75,000 sq. ft. granolithic sidewalk, $47,753; Barber Asphalt Paving Co., Arrott Bldg., 20,276 sq. yds. sheet asphalt paving and 1,633 cu. yds. excav., $32,036, and 11,800 sq. yds. sheet asphalt and 5,820 lin. ft. curb, $25,163; Ott Bros., 414 Washington Ave., 13,119 cu. yds. excav., 3,170 sq. yds. block, 3,310 ft. curb and 690 sq. ft. granite crossing, $12,364, and to Thos. Swaney Co., Pittsburg, 16,760 cu. yds. excav., 7,220 sq. yds. block, 4,090 lin. ft. sandstone curb and 1,375 sq. ft. granite crossing, $26,307.

York, Pa.—It is reported that contracts will shortly be let for paving 8 squares with asphalt or brick.

Union, S. C.—The citizens are stated to have voted to issue $25,000 street improvement bonds.

San Antonio, Tex.—About 1,000,000 sq. yds. of streets are to be macadamized at a cost of $250,000 and 55,000 sq. yds. paved with brick at a cost of $15,300. John D. Rullman, City Engr.

Ogden, Utah.—The Wheelwright Constr. Co. submitted the lowest bid on Apr. 8 for concrete sidewalk for the year 1905; it bid for 36,000 sq. ft concrete sidewalks, 10¼ cts. per sq. ft., 800 cu. yds. grading 43 cts., and 80 cu. yds. fill 45 cts.; and J. P. Oneill submitted the lowest total bid for curb and gutters required during the year 1905, at $4,071. His detail bid was as follows: 2650 lin. ft. concrete curb., 39 cts.; 80 cu. yd. filling, 40 cts.; 1060 cu. yd. grading, 43 cts.; 662 lin. ft. concrete gutter alone, 46 cts.; 2650 lin. ft. concrete C. & G. comb. per lin. ft., 82 cts.; 480 sq. ft. concrete for driveways, per sq. ft., 15 cts.

Spokane, Wash.—The Bd. of Pub. Wks. is stated to have opened the following bids on Apr. 6 for grading and constructing sidewalks on a portion of 3d Ave.: Mitchell Bros., $15,000; August Ilse, $15,000, and Peter Costello, E. 118 Mission Ave., $14,890.

Seattle, Wash.—Local press reports state that bids will be received until Apr. 29 by the Bd. Pub. Wks. for the Renton Hill paving project, estimated to cost about $400,000.

Bluefield, W. Va.—It is stated that $25,000 will be expended on brick paving.

**Superior, Wis.*—Olson & Johnson are stated to have received the contract for macadamizing Broadway for $11,156.

**Racine, Wis.*—The contract for paving a portion of Mead St. is stated to have been awarded to John O. Jones, 822 9th St., at $1.50 per sq. yd. for pavement and 32 cts. per ft. for curb.

**Janesville, Wis.*—The contract for brick paving on W. Milwaukee St., 2,133 yds., and E. Milwaukee St., 3,650 sq. yds. (bids opened Apr. 14) has been awarded to Elzy & Dunn, of Marshalltown, Ia., for $18,550.

National Home, Wis.—Bids will be received until May 18 by J. E. Armitage, Treas. Northwestern Branch, N. H. D. V. S., for constructing cement sidewalks.

Parry Sound, Ont.—It is stated that bids will be received, Apr. 25, by E. E. Armstrong, Town Clk., for laying about 55,000 sq. ft. of granolithic sidewalk.

Montreal, Que.—See "Public Buildings."

POWER PLANTS, GAS AND ELECTRICITY.

Notes Arranged Alphabetically by States.

Gadsden, Ala.—Judge Bilbo, on behalf of J. D. Hammond and C. B. Toman, has petitioned Council for a franchise for a gas plant.

Montgomery, Ala.—Press reports state that the Montgomery Light & Water Power Co. contemplates improvements, including the installation of a new unit at Tallassee. Robt. J. Chambers, Vice-Pres. and Gen. Mgr.

Carbonhill, Ala.—J. S. Shannon, Chmn. Com., writes that it is proposed to construct water works and an electric light plant at a cost of $25,000 to $35,000. No engineer selected as yet.

Sebastopol, Cal.—It is reported that bids will be received June 6 by Wm. T. Searles, Town Clk., for a franchise to construct and operate along streets, poles, wires, transformers, etc., for the transmission of electricity for electric light and power purposes and to operate electric light and power systems within said town.

Leadville, Colo.—Bids will be received Apr. 27 at the Treasury Dept. Washington, D. C.; (H. A. Taylor, Asst. Secy.) for furnishing and placing in position in the U. S. Post Office here certain combination gas and electric light fixtures.

**Bristol, Conn.*—Miles L. Peck, Pres. Bristol & Plainville Tramway Co., writes that the contract for laying approximately 10 miles of C. I. gas mains and specials (bids opened Apr. 12) has been awarded to Mella Bros., of Torrington, for about $9,000.

Washington, D. C.—Bids will be received May 2 at the Bureau Supplies and Accounts, Navy Dept., Washington, to furnish at the Navy Yards, etc., Portsmouth, N. H.; Boston, Mass.; Newport, R. I.; New York, N. Y.; League Island, Pa.; Annapolis, Md.; Washington, D. C., and Norfolk, Va., a quantity of naval supplies, including panel boards, cable, electrical supplies, water meters, Lunkenheimer's valves, pipe fittings, nickel steel, steel castings, steel angles, galvanized sheet steel, brass and iron pipe, pipe fittings, valves, etc. H. T. B. Harris, Paymaster-Gen. U. S. N.

Bids will be received May 10 by Col. Chas. S. Bromwell, office Pub. Bldgs and Grounds, for furnishing electric battery supplies, agricultural implements, iron pipe and plumbers supplies, sand, gravel, cement, brick, etc.

Jackson, Ga.—The City Council is reported to be considering the question of issuing bonds for water works and an electric light plant.

Chicago, Ill.—Bids will be receivel Apr. 25 by F. W. Blocki, Comr. Pub. Wks., for furnishing and erecting in the Chicago Ave. pumping station a vertical, high-speed, self-contained engine and electric light generator.

Connersville, Ind.—It is reported that the Connersville Light, Heat & Power Co. will soon ask for bids for improvements to its plant, estimated to cost about $25,000.

Lafayette, Ind.—It is reported that bids are wanted May 2 by W. S. Haggard, Chmn. Trus. Soldiers' Home, for constructing a power house, brick stack, boilers and extensions.

Muskogee, Ind. Ter.—H. Von Schon, Wayne County Bank Bldg., Detroit, has been selected by the Grand River Power Co. (C. N. Haskell, Pres., Muskogee) to report on the water development of Grand River. About 11,000-h.p. is probably feasible within a reasonable transmission distance from Muskogee.

Tishomingo, Ind. Ter.—C. N. Wells, of Tishomingo, and other interested parties have engaged H. Von Schon, Wayne County Bank Bldg., Detroit, Mich., to examine and report on the water power development of Blue River. If the engineer's report is favorable a company will be organized headed by C. H. Wells, of Tishomingo.

Iowa Falls, Ia.—The Iowa Falls Electric Light & Power Co. is reported to have sold its plant to the Peterson Heat, Light & Power Co., of Des Moines, and it is stated that the new company contemplates improvements and will add a heating system.

Hutchinson, Kan.—The Com. on Lighting (L. A. Beebe, Chmn.) has submitted a report to City Council recommending the construction of a municipal electric light plant at a cost of $25,000, and to contract with Emerson Carey to furnish the current to the plant.

Cottonwood Falls, Kan.—The City Council is reported to have granted W. G. Smith, of Bolivar, Mo., a franchise for an electric light and power plant.

Central City, Ky.—B. F. Creel writes that a company is about to be organized to construct an electric light plant at a cost of $10,000. R. B. Culbertson is also interested.

Carlisle, Ky.—Press reports state that the City Council will soon offer for sale a 10-yr. lighting franchise, agreeing to pay $90 per arc light per yr. for 25 or more lights to burn all night.

Easthampton, Mass.—The Directors of the Easthampton Gas Co. are reported to have voted to construct a new electric light plant, to be used for lighting the streets.

Nantucket, Mass.—E. A. Chapel, Receiver's Agent, Nantucket Gas & Electric Co., writes that from $10,000 to $25,000 will be expended in improvements. No engineer appointed as yet.

**Brockton, Mass.*—The Bartlett & Hayward Co., of Baltimore, Md., is stated to have secured the contract for storage tank for the Brockton Gas Co., for about $60,000. It will have a capacity of 500,000 cu. ft.

Springfield, Mass.—The Directors of the Springfield Gas Light Co. are reported to have voted to extend the mains this summer to Indian Orchard; probable cost of work, $40,000. D. F. Burrett, Supt.

**Jackson, Mich.*—The Commonwealth Power Co. is reported to have awarded contracts as follows for its power plant on Kalamazoo River: To the General Electric Co., Schenectady, N. Y., for boilers, and to Henry Vanderhorst, of Kalamazoo for the building. The company will also let contract for a 3-story office building to be erected at Jackson.

**Sault Ste. Marie, Mich.*—McArthur Bros. Co., of Chicago, Ill., is reported to have secured the contract for constructing a power house on St. Marys Rapids for the Edison Sault Electric Co.

Fairmont, Minn.—The Council is reported to have declared the bond issue recently voted for water works and electric light plant defeated. The votes were in the majority, but not large enough to carry the election.

Duluth, Minn.—Water and lighting bonds amounting to $140,000 and $100,000 bridge bonds were sold on Apr. 10.

Anoka, Minn.—It is reported that H. B. Strait, of Chicago, Ill., contemplates constructing a gas plant at Anoka.

Gibbon, Minn.—The Council is reported to be considering the construction of an electric light plant.

Moorhead, Minn.—It is reported that bids are wanted May 1 by H. E. Roberts, City Clk., for furnishing a 300-kw. generating unit for the electric light plant. Probable cost, $20,000. E. P. Burch, Engr., Minneapolis.

Marshall, Minn.—It is reported that improvements have been recommended to the water works and electric light plant.

Torah, Minn.—R. Zempel, Secy.-Treas. Torah Telephone & Improv. Co., writes that the only work contemplated by the company is the erection of a small telephone exchange. No water works or electric light plant contemplated.

Biloxi, Miss.—The City Council is reported to have granted D. W. Cheney, of Sparta, Wis., a franchise for the construction and maintenance of a gas plant.

Hattiesburg, Miss.—The City Council has granted H. L. McKee, of Meridian, and J. L. Kearney, of Hattiesburg, a franchise for an electric light plant. They recently secured a franchise for a gas plant.

Ponca, Neb.—The citizens are reported to have voted to issue $6,000 bonds for a lighting and heating plant.

Branchville, N. J.—The Branchville Electric Power, Water & Lighting Co., is reported incorporated with a capital of $30,000 by Chas. H. Crisman, of Branchville, S. S. Wills, Andover, and E. T. Wills, Standhope.

Long Island City, L. I., N. Y.—Bids will be received until May 1 by C. B. J. Snyder, Supt. School Bldgs., N. Y. City, for installing electric equipment in addition to School No. 71, Boro. Queens.

Canton, N. Y.—It is reported that the Electric Light Co. will expend $10,000 on improvements.

Rochester, N. Y.—Bids will be received by T. E. McGarr, Secy. State Comn. in Lunacy, Albany, Apr. 26 for plumbing and electric light wiring for store house, bakery and extension to laundry, heating bakery and extension to laundry; also installing new electric conduits, lighting and telephone cables and moving present pole line at Rochester State Hospital as advertised in The Engineering Record

**Niagara Falls, N. Y.*—The Archbold-Brady Co., of Syracuse, is reported to have secured the contract for the manufacture and erection of 400 49-ft. steel towers for the double transmission line between Niagara Falls and Lockport by the Niagara, Lockport & Ontario Power Co., for about $100,000.

Binghamton, N. Y.—Bids are wanted, May 8, for lighting the streets with 374 or more electric arc lights of a power equal to 2,000 c. p. from July 14, 1905, to burn from dusk to daylight every night, with proportionate rebate for outages; also price per M. watts for lighting city hall and other public buildings; also for furnishing, lighting and supplying illuminant and mantles and caring for 366 or more incandescent gas, naphtha, electric or other illuminant street lamps of at least 60 c. p. from June 20, 1905. Price for gas, naphtha, electricity or other illuminant to be stated separately. D. C. Herrick, City Clk.

Enderlin, N. D.—C. C. Dalrymple is stated to have secured a franchise for an electric light plant.

Williston, N. D.—The citizens are reported to have voted Apr. 5 to construct water works and an electric light plant.

Rugby, N. D.—A. H. Jones is stated to have secured a franchise for an electric light plant and telephone system.

Lockport, Ill.—S. D. Griffin, of Chicago, Clk. Bd. Trus., Sanitary Dist. of Chicago, writes that the following are the bids opened on Apr. 12 for the construction of a power house for the Lockport power development (bidders of Chicago, unless otherwise mentioned). (*a*) Hayes Bros. Co., Janesville, Wis.; (*b*) Falkenau Constr. Co.; (*c*) F. J. Cullen, (*d*) Jos. Hanreddy; (*e*) Schillinger Bros. Co.; (*f*) Jos. J. Duffy; (*g*) Wm. Grace Co.; (*h*) B. M. Zadeck Co.; (*i*) Griffiths & McDermott; (*j*) Gindele Bros. Co.:

	Power house complete.	Earth excav. and disposal, 5,000 cu. yds.	Solid rock excav. and disposal, 20,000 cu. yds.	Channeling in solid rock, 45,000 sq. ft.	No. 1 Portland cement concrete, 7,500 cu. yds.	No. 2 Portland cement concrete, 3,500 cu. yds.	No. 3 Portland cement concrete, 1,000 cu. yds.	Granolithic floor, 2,660 sq. yds.	Structural steel painted & erected, 520 tons.	Total.
a	$172,357	$0.35	$0.85	$0.20	$5.00	$4.35	$3.60	$0.60	$68.20	$293,492
b	180,474	.30	.80	.20	4.30	4.05	3.85	.40	68.00	293,673
c	187,800	.55	.75	.17	5.65	4.95	4.10	.35	63.50	310,951
d	147.000	.30	.90	.35	7.40	6.90	6.40	2.25	78.00	314,845
e	187,000	.40	1.00	.33	3.96	3.54	3.11	2.70	95.00	325,632
f	158,000	.50	1.00	.40	7.50	7.00	6.50	2.50	79.00	333,480
g	189,900	.50	2.25	.15	5.90	5.50	5.25	.70	....	363,762
h	227,677	.50	1.40	.20	7.65	6.45	5.90	1.00	81.00	397,807
i	237,900	.40	1.50	.40	6.00	5.75	5.25	1.50	90.19	409,164
j	343,000	.55	2.45	.25	8.40	7.80	6.60	1.90	77.00	547,994

**Items marked thus give the names of parties awarded contracts.*

Reading, O.—Later reports state that the $27,000 bonds recently voted for was for the construction of water works and not for an electric light plant, as previously stated.

Springfield, O.—The People's Light, Heat & Power Co., of Springfield, a combination of all the public service companies, is reported incorporated, with a capital of $2,000,000. Incorporators: F. M. Hagan, Walter L. Weaver, John F. Zimmerman and others.

Norwalk, O.—The Bd. of Public Service is reported to have granted to the Cleveland & Southwestern Traction Co. (E. F. Schneider, Purchasing Agent, Cleveland) a franchise to light Norwalk.

Cleveland, O.—The People's Electric Light & Power Co. is reported incorporated with a capital of $10,000 by H. I. Emerson, W. McBride, D. F. Crane and others.

Harrisburg, Ore.—The City Council is reported to have decided to issue bonds for water works and an electric light plant.

Sunbury, Pa.—Geo. W. Wagenseller, of Middleburg, and David Goldstein, of Pittsburg, are reported to have secured electric light franchises in Sunbury, Selinsgrove and Middleburg. A trolley will also be constructed from Sunbury to Mifflintown.

Ft. Washington, Pa.—Harvey S. Souder and Sam'l S. Alderfer, both of Souderton, and others are about to petition the Governor for a charter for the Wissahickon Electric Co. to supply light, heat and power in Whitemarsh Township.

Pittsburg, Pa.—Bids will be received May 12 by Wm. L. Sibert, Corps Engrs., U. S. A., for building a power house at each of dams Nos. 3, 4 and 5, Ohio River.

Architects Palmer & Hornbostel are stated to have completed plans for the temporary heat, light and power plant for the Carnegie Technical Schools; it is proposed to equip the building with machinery totaling about 650-h.p.

It is stated that bids will be received until May 1 by the Schenley Farms Co. (H. T. Douglas, Jr., Ch. Engr., 4203 5th Ave.) for improving a portion of their property in the 14th Ward, requiring 64,600 ft. of 1¼-in. block service gas pipe, 2-in. block pipe gas mains and 6-in. c. i. gas mains.

Columbia, Pa.—The Council is reported to have passed an ordinance granting a franchise to the Columbia Light & Power Co.

Knoxville, Tenn.—Jas. B. Cahoon, Consulting Engr., 42 B'way, New York, N. Y., writes that only preliminary work has yet been done on the proposed plant of the Knoxville Power Co., probable cost of work complete, $2,790,000.

Bolivar, Tenn.—It is proposed to petition State Legislature for permission to issue $20,000 bonds for water works and an electric light plant.

Dresden, Tenn.—The State Senate is reported to have passed a bill authorizing this city to issue $10,000 bonds for water works and an electric light plant.

San Angelo, Tex.—A charter is stated to have been granted to the San Angelo Gas Co., with a capital of $40,000, to establish and operate a plant for the manufacture of gas. Incorporators: W. F. Casey, Hugh Jackson and Chas. Schuwerth.

Salt Lake City, Utah.—Wm. A. Clark, of Salt Lake City, has made application to the State Engr. to appropriate 300-second feet of water from Blacksmiths Fork River for the development of power. It is expected that 2,000-h.p. will be generated, most of which will have to be transmitted for a distance of about 60 miles; total cost of plant and lines will be about $75,000.

Spooner, Wis.—The Crowley Electric Co., of Duluth, Minn., is stated to have secured the contract for constructing an electric light plant. Engineer, Oscar Claussen, of St. Paul, Minn.

Spring Valley, Wis.—The Council is reported to have granted R. D. Harrison a franchise for an electric light plant.

Burlington, Wis.—The citizens are reported to have voted in favor of municipal lighting.

Monroe, Wis.—The citizens are reported to have voted for municipal gas works.

**La Crosse, Wis.*—Engr. Jacob Cloos, Matthews Bldg., Milwaukee, writes that contracts for work in connection with the construction of the light and power plant on the north side for the Wisconsin Light & Power Co. have been awarded as follows: To Babcock & Wilcox, of Chicago, Ill., for 1,500-h.p. boilers, 225 lbs. steam pressure and to the Alberger Condenser Co., of New York, N. Y., for the condenser system, two units of 1,600 sq. ft. each.

Niagara Falls, Ont.—The Niagara-Welland Power Co. is reported formed with a capital of $5,000,000 to construct a power plant at St. Catherines and transmission lines for the distribution of power in Western Ontario. Harry Symons, Pres., Roderick J. Park, Consulting Engr., both of Toronto.

ELECTRIC RAILWAYS.

Notes Arranged Alphabetically by States.

Salinas, Cal.—H. V. Quigg, Pres. of the Monterey County Gas & Electric Co., signed a contract in which he agrees that if the residents of Monterey, Pacific Grove and Salinas will donote $50,000 to guarantee the interest of the necessary investment for the first three years the road is operated, to build, equip and put in operation an electric railway which will ultimately be extended to Hollister and later into the San Joaquin Valley and Fresno. The work will cost $300,000. The line will be 16 miles long.

Benicia, Cal.—F. P. Weinman, City Clk., writes that F. A. Brand, of Benicia, has secured a franchise for an electric railway.

Hartford, Conn.—The Hartford, Middletown & New Haven Tramway Co. is reported to have applied for a franchise to construct a railway from terminus of one of the lines of the Hartford St. Ry., in Wethersfield, and extend through Rocky Hill, Cromwell, Middletown, Middlefield and Durham to lines of the Consolidated Ry. Co., at Montowese.

Springfield, Ill.—The Marion & Harrisburg Electric Ry. Co., with offices at East St. Louis, is reported incorporated with a capital stock of $10,000. The road is to be constructed from a line near the western limits of Marion, and will extend in an easterly direction through the counties of Williamson and Saline to the city of Harrisburg. Incorporators are C. S. Clarke and Alex. G. Cochran, of St. Louis; W. S. Foreman, of East St. Louis, and others.

**South Bend, Ind.*—Geo. Townsend, of Indianapolis, is stated to have received the contract for building the extension for the South Bend & Southern Michigan Ry. from Niles to St. Joseph, Mich., a distance of 24 miles. J. McM. Smith, Gen. Mgr., South Bend.

Terre Haute, Ind.—The Terre Haute & Indiana Southern Traction Co. is stated to have received a franchise for the use of one street from the southern city limits to the center of the city for its line, which is to be constructed from Sullivan and thence to Linton.

Indianapolis, Ind.—It is stated that the Indianapolis & Martinsville Rapid Transit Co. will build the extension from Martinsville to Bloomington this summer.

Iowa City, Ia.—The Cedar Rapids & Iowa City Interurban Ry. Co. is stated to have decided to extend the line from Iowa City to Muscatine, a distance of 39 miles, and to complete the extension this year if possible. The construction work will be done under the name of the Iowa City & Eastern Ry. Co., which was organized last year by practically the same parties who control the Cedar Rapids & Iowa City line.

New Orleans, La.—It is stated that the New Orleans Ry. Co. contemplates making the following improvements: Constructing the Judah Hart extension at a cost of about $52,000; an extension between the present canal and Claiborne division; erecting the Poland car house at a cost of about $22,500, and $8,000 will be expended in laying a switch track in Lafayette Ave., between the Villere and Dauphine lines.

Ossining, N. Y.—Control of the Westchester Traction Co. has passed to Philadelphians. R. N. Law, of Philadelphia, will be president of the company; C. E. Lent, of Philadelphia, vice-president, and Samuel Haigh, of Philadelphia, Gen. Mgr. It is planned to connect the road with the Tarrytown, White Plains & Mamaroneck branch of the Union Ry.

Toledo, O.—The Toledo Southern Traction Co. is reported incorporated with $100,000 capital by Geo. B. Kerper, Willard F. Robinson, Thos. H. Tracey and Chas. F. Chapman, Jr., to construct a line from Toledo to Greenville, passing through Lucas, Wood, Henry, Putnam, Auglaize, Mercer and Darke Counties. The road will be about 150 miles long.

Dayton, O.—The Dayton & Northeastern Ry. Co. is reported incorporated with $100,000 capital, by Hugo Cook, W. W. Chambers, J. J. Hall, F. W. James and W. W. Shuey, to construct a line from Dayton to Kenton. According to reports work will be started at once on the proposed line.

Cleveland, O.—It is reported that preliminary work for the new cut-off from Avon to South Lorain, which is to be built by the Lake Shore Electric Ry. Co. (Warren M. Bicknell, Pres.), is being made by Ch. Engr. Arnold. Material for the line will be purchased in the near future, and the work will be rushed so as to have the line in operation this summer.

Zanesville, O.—The Black Diamond Traction Co. is reported to have under consideration the construction of the following lines: Zanesville to Athens, 64 miles; Marietta to Pomeroy, 48 miles; Marietta to Bellaire, 70 miles.

Youngstown, O.—It is stated that the Youngstown & Southern Ry. Co. announces that construction work will start within the next 2 weeks on the extension from Columbiana to East Liverpool. Contracts for the electrical equipment for the road are to be placed in the near future.

Wooster, O.—The Wooster & Mansfield Electric Ry. Co. is reported formed, with R. H. Critchfield, Pres., and David Collier, Secy., to build a line from Wooster to Mansfield. They are considering the advisability of adopting a gasolene motor car.

Galion, O.—It is stated that the Galion Southern Electric Ry. announce they will commence construction work as soon as the weather will permit. The line will extend south from Galion to Blooming Grove, Johnsville and Fredericktown, connecting at the latter point with a proposed line to Mt. Vernon and Columbus.

York, Pa.—The York and Susquehanna St. Ry. Co. is reported to have received a franchise to construct a suburban railway from York to Long Level, on the Susquehanna River. The proposed route is about 14 miles long, and will pass through Green Hill, Longstown, Yorkana and East Prospect, terminating at Long Level. Capital, $84,000. Wm. Hall, Pres. The directors: Joseph T. Walmsley, John F. B. Attson, Wm. Fine Gleason and Joseph B. Lanning, all of Philadelphia.

Corry, Pa.—The Northeast & Findlay Lake St. Car Co. is reported incorporated with a capital of $130,000. J. H. Nichols, of Titusville, is reported interested.

Sunbury, Pa.—See "Power Plants, Gas and Electricity."

Madison, S. D.—The construction of an electric railway from Madison to Brookings, a distance of about 30 miles, is reported under consideration. W. H. Roddle, H. H. Reeves, Horace Fiskback, J. P. Olson, M. G. Carlisle are stated to have been selected to look after the preliminary work.

Knoxville, Tenn.—The East Tennessee Electric Ry. Co. is reported to have received a franchise for an electric railway between Knoxville and Concord.

It is stated that the Knoxville & Sevierville Electric Ry. Co. will construct a line between Knoxville and Sevierville.

Gallatin, Tenn.—The construction of an electric railway from Gallatin to the Cumberland River and Castilian Springs is reported under consideration. Chas. A. Whitesides and W. G. Schamberger are reported interested.

Toronto, Ont.—Among the applications for railway legislation at the present session of the Legislature will be one for the incorporation and the construction of an electric railroad to run from St. Catharines to Dunnville and Port Dover. W. J. Aikens, W. F. Haskins and Jas. Rolton, of Dunnville, N. B. Gash, of Toronto, and others are reported interested.

Niagara Falls, Ont.—It is stated that the Niagara, St. Catharines & Toronto Electric Ry. Co. would commence immediately to survey the road from Hamilton to Toronto, but if the application for an extension of time is refused by Parliament the company will build over the Niagara & Toronto Power Company's right of way from Toronto to Niagara Falls, which was intentionally made wide enough to premit the building of an electric railway. It is intended to run a spur line from Stoney Creek to Hamilton and Hamilton Beach.

RAILROADS.

Notes Arranged Alphabetically by States.

Eudora, Ark.—A charter is reported to have been granted for a branch line of the Missouri Pacific R. R. (E. F. Mitchell, Engr. of Construction, St. Louis, Mo.) through Chicot County, to begin at Eudora and fun south to the State line, a distance of 10 miles, and then through the parishes of Carroll and Franklin, Louisiana, to Gilbert, a total distance of 76 miles; total cost of this work reported to be about $1,140,000.

Lonoke, Ark.—J. M. Parker and Eugene A. Hunderlin, of Colorado Springs, Colo., are reported to have submitted a proposition to build a line from Lonoke, via Pine Bluff to Monticello, for a cash bonus of $75,000, $37,500 to be paid when the road is completed to Monticello, and the balance when the road is completed to the Louisiana line.

Denver, Colo.—The Union Pacific R. R. Co. (John B. Berry, Ch. Engr., Omaha, Neb.) will, according to press reports, expend about $2,000,000 on the construction of a cut-off between Denver and Cheyenne and the tunneling of Athol Hill, outside of Cheyenne.

Gainesville, Ga.—A charter has been granted to the Gainesville, Dahlonega & Northern R. R. Co. Incorporators: A. J. Warner, W. A. Carlisle and H. H. Dean, all of Gainesville, and J. F. Moore and R. H. Baker, of Dahlonega. The main line of the road will be 25 miles in length, and, in addition, the company will construct a branch to the Chestatee pyrites mines.

Athens, Ga.—Engineers are reported to have completed the survey of the extension of the Gainesville Midland R. R. (Sam'l C. Dunlap, Gen. Mgr., Gainesville) from Athens to Jefferson and the survey for broadening the gauge from Jefferson to Gainesville.

Oglethorpe, Ga.—The Atlantic & Birmingham Constr. Co. has grading work to let between Oglethorpe and Talbotton, Ga., in large and small quantities. Information can be had by writing to Alex. Bonnyman, Ch. Engr., Oglethorpe.

Sycamore, Ill.—Chicago, Great Western R. R. Co. (A. Munster, Ch. Engr., St. Paul, Minn.) is stated to have completed a survey and will soon commence active work on a branch road which will run from a point near Sycamore to Peoria.

**Danville, Ill.*—The contracts for constructing the Indiana Harbor Ry. (C. W. Hotchkiss, Pres., LaSalle St. Station, Chicago) have been awarded to MacArthur Bros. Co., Chicago; Winston Bros. Co., Minneapolis, Minn., and the Knickerbocker Ice Co. The new road extends from Danville, Ill., to Indiana Harbor, Ind., connecting the coal fields of Illinois and Indiana with the Great Lakes by a double-track, air-line route. It is to be laid with low north-bound grades and heavy steel and the contracts are understood to call for the completion of the entire 117 miles of double track by Nov. 15. A number of concrete structures are to be built and the grading is reported to require the moving of about 6,000,000 cu. yds. of material, which will be largely steam shovel work. MacArthur Bros. Co. has the contract for the first 50 miles out of Danville, Winston Bros. Co., for the next 50 and the Knickerbocker Ice Co. for the last 17 miles.

Brazil, Ind.—The Vandalia R. R. Co. (F. W. Hatch, Ch. Engr., St. Louis, Mo.) is reported to have under consideration the construction of a new line to extend from the vicinity of Brazil to Linton.

New Orleans, La.—Press reports state before plans which had been formed by the 'Frisco R. R. (J. F. Hinckley, Ch. Engr., New Orleans, La.) for its New Orleans terminals were carried out, the company would expend more than $10,000,000 in addition to the $5,000,000 already expended.

Hazen, Nev.—The Nevada & California R. R. Co. is reported to have been incorporated with a capital of $15,000,000, to build a cut-off from Hazen, on the line of the Central Pacific in Nevada, to Churchill, a distance of 27 miles, and in addition to build approximately 125 miles of track between Keeler and Mojave. Wm. F. Herrin, Ch. Counsel, and Wm. Hood, Ch. Engr., of the Southern Pacific R. R. Co., both of San Francisco, Cal., are among the incorporators.

Belen, N. M.—It is reported that at a cost of $10,000,000 the Santa Fe R. R. Co. (W. B. Storey, Ch. Engr., Topeka, Kan.) will bu cut-off to the Pacific Coast to extend fro len, N. M., to Texico, on the line be Texas and Mexico, a distance of 250 m

Winston-Salem, N. C.—The citizens ar ported to have voted, Apr. 11, to issue $10 bonds to aid in the building of the South R. R. from this city to Wadesboro or other point in the eastern part of the Stat

Cincinnati, O.—The directors of the C land, Cincinnati, Chicago & St. Louis Ry. (G. W. Kittridge, Ch. Engr., Cincinnati) reported to have recommended an increas the capital stock of $11,300,000, of which 600,000 is to be used to pay for improven of various kinds.

Panama.—Bids will be received by T. H. bottom, Purchasing Agt., Panama R. R. 24 State St., New York, N. Y., until Ma to furnish a number of locomotives, box flat cars, cabooses, passenger cars, wre cranes and pile driver.

Heath Spring, S. C.—H. Gould, Secy.-T Excelsior Granite Co., writes that the com expects to begin within the next 30 days construction of 6 miles of standard gauge road to connect their quarries with the ne point on the Southern R. R. and will be in market for relaying rails and track equip

Morristown, Tenn.—The Southern Ry. (G. R. Loyall, Div. Supt., Knoxville, Tenn. reported to have engineers in the field bet Knoxville and Morristown for the purpo surveying for a double track. It is said work will be done in the early summer.

**Chattanooga, Tenn.*—W. J. Oliver & Co Knoxville, are reported to have secured the Southern Ry. Co. the contract to build tunnel through Lookout Mountain, near C tanooga, Tenn., on its extension from Ch nooga to Stevenson, Ala.

Houston, Tex.—A charter has been gra to the Houston, Beaumont & Red River Co Co., with a capital of $50,000, with Ed. nedy and R. C. Duff, of Beaumont, and H. Cortes and J. O. Ross, of Houston, as in porators, to build a line in Harris, Lib Hardin, Jefferson, Orange and Newton C ties.

San Miguelito, Nicaragua.—The Govern of Nicaragua has made a contract with E Julio Wiest to construct a railroad from Miguelito on Lake Nicaragua, to Mor Point, on the Caribbean Sea.

Winnipeg, Man.—Press reports state that Canadian Pacific R. R. Co. (W. F. Fye, Engr., Montreal, Que.) proposes constructin Lake Winnipeg extension of 16 miles this y it is also desirous of biulding 25 miles and 25 miles west of Saskatoon for the c venience of the large settlements in that te tory; also to make arrangements to build f the northwestern section south to Quill La

Lima, Peru.—An agreement is stated to h been reached between the Government of P and Henry Duncan Lewis MacDougall, for construction of a railway from Chorrillos Pisco.

PUBLIC BUILDINGS.

Notes Arranged Alphabetically by States.

Tuskegee, Ala.—Bids will be received A 28 by M. B. Abercrombie, Judge of Prob for erecting a court house. J. W. Golucke Co., Archts., Temple Court Bldg., Atlanta,

Long Beach, Cal.—It is reported that the of Trus. has rejected all bids recently recei for erecting the pavilion auditorium and will h the plans modified so as to bring the cost w in the appropriation, which is $30,000.

San Bernardino, Cal.—The Bd. of Mgrs. the Southern California State Hospital (Lyn M. King, Secy), it is stated, has passed a re lution to receive plans for a new wing to erected at the Hospital to cost about $65,000

Washington, D. C.—Bids will be receiv May 3, by Elliott Woods, Supt. U. S. Capi Bldgs. and Grounds, for c. i. pipe and fitti for underground drainage for the office bui ing, House of Representatives, also May 17 the structural steel work in connection with construction of 2 floors of the office buildi House of Representatives.

Washington Barracks, D. C.—Bids will be ceived by Capt. John Stephen Sewell, Co Engrs., U. S. A., May 13, for the ornamen terra cotta for the Army War College, as adv tised in The Engineering Record.

*It is reported that Gen. Mackenzie, Ch. Engrs., has awarded a contract for the co struction of a timbrel arch, floor, roof and ce ing, at the Army War College Bldg. in Washington barracks reservation (bids receiv Apr. 8) to R. Guastivono & Co., of New Yo City, at $34,385. The arch, etc., is to be co structed of flat tiles of the best terra cotta.

**Macon, Ga.*—The Mankin Constr. Co., Ric mond, Va., has secured the contract for co structing the U. S. Post-Office (bids open Apr. 3) for $215,850.

Boise, Idaho.—Plans will be received June by the Capitol Bldg. Comn. (Will H. Gibso Secy.) for the Capitol. Appropriation $350,00

Chicago, Ill.—The Illinois Charitable Eye an Ear Dispensary has acquired 5 lots adjoini the present location at 12 Peoria St., and is ha ing plans prepared for a new building for wh $75,000 has been appropriated.

Rochester, Ind.—Press reports state that bi will be received May 1 for erecting a Carneg Library; probable cost, $10,000.

Lafayette, Ind.—See "Power Plants, Gas an Electricity."

Valparaiso, Ind.—Press reports state that b will be received until May 6 by the Co. Com

**Items marked thus give the names of parties awarded contracts.*

g a county infirmary for which $25,000 ppropriated.

o, Ia.—J. A. Bean & Co., of Ma- have secured the contract for heating Post Office (bids opened Mar. 30) for

. Scales, of Waterloo, it is reported, d the contract to erect the west side library at $15,950.

y, Kan.—The following are reported lowest bids received for erecting a storehouse and a veterinary hospital st, and also for plumbing, etc., for gler & Ziegler, Junction City, store ,774; Ziegler & Dalton, of Junction inary hospital, $16,866; Graber Bros., Kan., plumbing, heating and wiring, of $4,432.

n, Ky.—Bids will be received, Apr. W. Porter, Secy. Park Comn., for auditorium in Woodland Park, the nclude excav. and found. masonry, carpentry, iron and steel work, con- ; galvanized iron work and roofing; and cut-stone bids will also be re- an auditorium; to be constructed en- oncrete and steel; probable cost, $20,- rson & Faig, Consulting Engrs., Me- ngr. Dept., Ky. State College.

t, Ky.—It is reported that the Cap- Com. (Harry B. Ware, Secy.) will about June 5 for erecting the capitol

leans, La.—Plans and specifications eceived by the Secy. Court House til June 15 for a court house, cost eed $800,000.

e, Md.—Bids will be received, Apr. Bd. of Awards (E. Clay Timanus, erecting an addition to the Woman's the City Jail.
l be received Apr. 26 by the Bd. of . Clay Timanus, Pres.) for erecting house No. 26 at Leadenhall and West

l, Md.—A. G. Ross, Clk. Co. Comrs., the contract for erecting a 2-story stone jail and sheriff's residence (bids r. 12) has been awarded to Brady ., Fairmont, W. Va., for $35,981.

ad, Mass.—The following are the d on Apr. 6 by the Superv. Archt., t., Washington, D. C., for the gen- uction, including plumbing, heating, ing and conducts, U. S. Post Office, ead: A. Hathaway & Son, Boston, lack & Moore, Boston, $51,900; Haynes Co., Boston, $44,277; H. P. Boston, $44,309; Fosburg & Co., 7,241; A. B. Stannard, New York, ,750; J. E. Locatelli, Boston, $57,000; ter, Beverly, $53,500; Richardson & Vashington, D. C., $42,688; Horton & Boston, $48,977; Fissel & Wagner, $43,089; C. H. Dodge Constr. Co., 0,762; J. W. Bishop, Worcester, $51,- Wheaton Bldg. & Constr. Co., Put- ., $54,785.

Mich.—Bids will be received May 23 nox Taylor, Superv. Archt., Washing- for constructing the U. S. Post Of-

Mich.—The Bd. of Estimates, Apr. 14, appropriation of $100,000 for a con- eases hospital.

Minn.—The Co. Comrs., according have decided to reject all bids re- erecting the poor house and to have lans submitted by A. J. Vandeusen, 8. The cost of the building is not $20,000.

, Miss.—Bids will be received by l. Superv. (C. P. Smith, Clk.), until furnishing and erecting cells in the il. And. J. Bryan, archt., 708 Hen- New Orleans, La.

, Miss.—The Bd. of Superv. is about r sale $50,000 court house bonds.

ia, Miss.—L. C. Willborn, Chancery es that the contract for erecting a se (bids opened Apr. 10) has been H. H. Hallas & Co., of Columbia, for

N. H.—Bids will be received May Trus. New Hampshire State Hospital alding, Chmn.) for furnishing mate- erecting a hospital, 6 iron fireproof storehouse and employes' building. Butterfield, Archt., Manchester.

rk, N. Y.—Bids will be received, Apr. Dept. of Health (Thos. Darlington, s.), for furnishing material and erect- porary boiler-house in the old scarlet lion, at the Willard Parker Hospital, 16th St., Boro. Manhattan.
l be received until May 1 by John F. res. Manhattan Boro., for furnishing nd plumbing work, etc., in 13th Dist. Court.
ll be received until Apr. 28 by the Charities (Jas. H. Tully, Comr.), for material and repairing roofs, leaders s on the various buildings of the N. ome for the Aged and Infirm, Black- nd, and for putting shields on all and steam coils in certain buildings, Island.

N. Y.—Bids will be received by the rcht., Treas. Dept., Washington, D. 25, for the construction complete of st Office at Geneva, as advertised in eering Record.

Rochester, N. Y.—See "Power Plants, Gas and Electricity."

Hillsboro, N. D.—Bids will be received May 3 by Peter Davidson, Co. Aud., for furnishing material and erecting a court house. Separate bids will be received for the general work, plumbing, heating and electrical work. Buechner & Orth, Archts., 602 Manhattan Bldg., St. Paul. Minn.

Jamestown, N. D.—Bids will be received until May 2 by the Bd. of Trus. of the State Hospital for the Insane (Frank Ingalls, Pres.) for erecting a ward building.

Norwalk, O.—Bids will be received by the Bd. Co. Comrs., May 10 for furnishing material and erecting the Administration Bldg. at the Huron Co. Infirmary Farm. J. H. Beattie, Co. Aud.

Steubenville, O.—Bids will be received. May 9, by Geo. P. Harden, Co. Aud., for furnishing material and erecting a county infirmary and boiler house on the Poor House Farm (Fred W. Elliott, Archt., Bd. of Trade Bldg., Columbus, O.

Akron, O.—The Council, it is stated, has decided to erect a city hall at Buchtel Ave. and S. Main St., to cost $125,000.

Dayton, O.—Bids will be received May 17 by the Bd. Trus., Dayton State Hospital (A. F. Shepherd, Secy.) for furnishing materials and erecting a hospital, barn and laundry. Frank M. Andrew, Archt., Conover Bldg.

Marion, O.—J. E. Phillips, Chmn. Bldg. Com. of the City Council, it is stated, has been authorized to accept the $25,000 offered by Andrew Carnegie to erect a library. It is stated that plans will be drawn for the building at once.

Cincinnati, O.—Separate bids will be received May 11 by the Dirs. of the Longview Hospital (C. H. Smith, Secy.) for furnishing material and doing work as follows: Remodeling present heating system into an automatic atmospheric system; for a new system of power piping, pumps, heaters, etc., connecting old power plant; for 3 water tube boilers, brick work, fixtures, etc.; plans and specifications may be secured upon a deposit of $25, from Dr. F. W. Harmon, Supt.

**Hollidaysburg, Pa.*—The following are reported to be the bids received Apr. 3 for erecting the addition to the Blair County Court House and for remodelling the old building: A. S. Wilson & Co., per John Shriner, of Pittsburg, $104,985; W. H. Herr, Altoona, $116,971; Vipond Constr. Co., Altoona, $111,119; P. W. Finn, Altoona, $107,125; Saml. R. Harris, Pittsburg, $115,000; W. V. Hughes & Son, Hollidaysburg, $106,500 (awarded contract); Ed. Gilbert, Philadelphia, $108,967, and Caldwell & Drake, Philadelphia, $112,729

Philadelphia, Pa.—Henderson & Co., 1221 Arch St., it is stated, submitted the lowest bid for erecting a fire engine house at 214 Pine St., at $16,597. H. B. Shoemaker & Co., 17 S. 9th St., submitted 2 bids for erecting a bath house at Bridge St. and Ferry road, at $11,562 and $10,422, and John Morris bids for the same work $11,800 and $10,385.

Bids will be received May 1 by the Bd. Pub. Safety (David J. Smyth, Dir.) for the erection of buildings for the Home for the Indigent, 41st Ward, and new Municipal Hospital, 33d Ward, and for erecting a bath house, 18th Ward; probable total cost, $700,000. A deposit of $200 required on each set of plans and specifications pertaining to the Home for the Indigent and the new Municipal Hospital respectively, and $50 required for the bathhouse. Philip H. Johnson, Archt., 1825 Land Title Bldg.

Bids are wanted May 12 for removing end wall of present building and extending a one-story brick and steel building, 36x45 ft. for loading room small arms ammunition plant at Frankford Arsenal. Lieut. Col. Frank Heath, Comdg., Ord. Dept., U. S. A.

Pittsburg, Pa.—Geo. H. Schwan, 326 4th Ave., it is stated, has been selected to prepare plans for an engine house to be erected at Northumberland St. and Shady Ave., at a cost of $40,000.

M. J. Sturm, 84 La Salle St., Chicago, Ill., it is stated, is preparing plans for a $125,000 hospital to be erected by the St. Joseph Assoc. The plans are to include hospital, laundry and engine room.

Altoona, Pa.—The House of Representatives has passed a bill appropriating $50,000 for improvements at the Altoona Hospital.

Providence, R. I.—The erection of a court house at a cost of $275,000 is reported under consideration.

Rockhill, S. C.—Bids will be received by D. B. Johnson, Pres. Winthrop College, until May 2, for erecting the Carnegie Library. A deposit of $25 will be required on plans and specifications. Jas. M. McMichael, Archt., Charlotte, N. C.

Memphis, Tenn.—It is reported that M. J. Sturm, 84 La Salle St., Chicago, Ill., is preparing plans for a hospital which is to be erected by the Woman's Hospital Assoc., at a cost of $50,000.

Crossville, Tenn.—Bids will be received, Apr. 25, by Wm. Whitlock, Chmn. Bldg. Com., for furnishing material and erecting a 2-story stone court house to cost about $25,000. W. Chamberlain & Co., Archts., Birmingham, Ala.

Grundy, Va.—Bids will be received, May 10, by the Co. Bd. Superv. (Geo. W. Childress, Chmn.) for erecting a stone court house. For further information address M. F. Browning, attorney, Grundy.

Lynchburg, Va.—The Bldg. Com. appointed by the Bd. of Directors of the Presbyterian Orphans' Home, it is stated, has adopted plans prepared by Frye & Chesterman, of Lynchburg, for buildings to be erected at the Home, at a cost of about $75,000.

**Marion, Va.*—John P. Sheffer, Jr., Secy. Court House Bldg. Com., writes that the contract for erecting a court house and a jail (bids opened Apr. 12) has been awarded to Stephenson & Getaz, of Knoxville, Tenn., for $48,082.

Steilacoom, Wash.—Archts. Proctor & Farrell, National Bank of Commerce Bldg., Tacoma, writes that bids will be received May 1 for erecting an addition to the insane asylum at Steilacoom, to consist of 2 buildings to have brick reinforced concrete floors, plumbing, steam heating, iron and steel work, etc., to cost about $100,000.

National Home, Wis.—Bids will be received until May 15 by J. E. Armitage, Treas., Northwestern Branch N. H. D. V. S., for a ventilating apparatus for the hospital.

Darlington, Wis.—F. W. Kinney, of Minneapolis, Minn., it is stated, will have plans ready about May 1 for the court house to be erected here of stone, at a cost of about $115,000.

Lancaster, Wis.—It is stated that bids will be received Apr. 26 by W. J. Brennan, Chmn. Bldg. Com., for erecting a hospital on the Grant Co. Farm, about 2½ miles from Lancaster. Separate bids will be received for plumbing and heating. H. Kleinhammer, Archt., Platteville, Wis.

Monterey, Mex.—Alfred Giles, of San Antonio, Tex., has prepared plans for a fire proof orphan asylum, to be erected here at a cost of $50,000.

Chihuahua, Mex.—Alfred Giles, San Antonio, Tex., has prepared plans for a $40,000 market house of steel construction to be erected here by the State. He has also prepared plans for a 4-story fire proof city hall, to be erected at a cost of $50,000.

Montreal, Que.—The Finance Com., it is stated, has appropriated $212,000, portions to be used as follows: $10,000 for an incineration plant; $48,965 for fire stations and $140,500 for roads.

BUSINESS BUILDINGS.

Notes Arranged Alphabetically by States.

Mobile, Ala.—Stone Bros., of New Orleans, it is stated, have prepared plans for the Battle House, which is to be a 10-story fireproof structure and is estimated to cost $450,000. Duggan & Taylor are agts. of the property.

Palo Alto, Cal.—Plans are being prepared for a $20,000 business building and theater that F. C. Thiele intends erecting on Alma St.

Hartford, Conn.—The Bldg. Com. of the Travelers Insurance Co. has engaged Edw. T. Hapgood, of Hartford, and Donn Barber, of New York, N. Y., to prepare plans for the new building which is to be erected at Main and Grove Sts.

Cordele, Ga.—The Masons have decided to erect a 3-story brick temple at a cost of $20,000.

Chicago, Ill.—Albaugh Bros. Dover & Co., 341 Franklin St., have secured a site at 21st St. and Marshall Boule. and will at once start to build a plant of its own. An 8-story main building and a smaller 3-story one, 26x200 ft., are to be built now at a cost of $125,000, and other buildings will be added as fast as operations can be carried on.

*The Geo. A. Fuller Co., of N. Y. City, it is stated has the general contract for the construction of the Boston Store building at State, Madison and Dearborn Sts. for Mrs. Chas. Netcher. Estimated cost of the structure is $3,000,000. Holabird & Roche, Archts., 1618 Monadnock Bldg.

J. L. Kesner, manager of the Fair, will construct at Wabash Ave. and Madison St. a 15-story building to cost $500,000.

Plans are being prepared for the reconstruction of the Vincennes apartment hotel at Vincennes Ave. and 36th St. Erven E. Busby, the owner, intends erecting a 6-story fireproof structure to cost $100,000.

D. S. Pentecost, 2466 N. Ashland Ave., has completed plans for a 3-story store, office and flat bldg, to be erected at 43d St. and Vincennes Ave. for Fairbanks & Mower, at a cost of $50,000.

Part of the spring construction contemplated by Armour & Co. in the stock yards includes a 5-story wholesale market of brick and heavy mill construction, and a 5-story hoghouse of the same material. The 2 buildings will cost $200,000.

The Pineule Medicine Co. has had plans prepared by Wm. Klewer, 109 Randolph St., for a 3-story factory, 52x141 ft., to be erected on La Salle Ave., near Elm St., at a cost of $20,000.

Peoria, Ill.—W. G. Schmidt, it is stated, intends erecting a hotel on First Ave., at a cost of $20,000.

Indianapolis, Ind.—The Indianapolis Masonic Temple Assoc., it is stated, has been incorporated with a capital of $150,000 for the purpose of erecting a temple here. R. N. Bennett and John W. Hotzman are among the directors.

**Davenport, Ia.*—The Tri-City Constr. Co., Masonic Bldg., it is reported, has received the contract to erect the Lane Bldg. at Main and 3d Sts., at a cost of $75,000.

Sioux City, Ia.—R. E. Purslow will rebuild West Hotel, 3d and Nebraska Sts., at a cost of $70,000. W. W. Beach, Archt., 721 Toy Bldg.

Jackson, Mich.—See "Power Plants, Gas and Electricity."

**Des Moines, Ia.*—The W. F. Mitchell Co., 116 8th St., it is reported, has received the contract to erect the 6-story building for the Homestead Publishing Co., at 3d and Locust Sts.

Louisville, Ky.—A 6-story hotel is to be erected here at a cost of $200,000. W. R. Abbott may be able to give further information.

Baton Rouge, La.—It is stated that C. H. Charlton, of New Orleans, has prepared plans for a home for the Elks which is to cost about $20,000.

New Orleans, La.—See "Electric Railways."

Cumberland, Md.—The Cumberland Constr. & Dramatic Co., has been incorporated with a capital of $50,000 and intend erecting a theater on the Carnival Grounds. Incorporators: Geo. G. Young, L. G. Sizer and others.

**Baltimore, Md.*—E. D. Preston, 22 Bldrs. Exchange Bldg., it is reported, has received the contract to erect a 3-story addition to the plant of the Phoenix Pad Co., at Monroe and Eagle Sts., at about $25,000.

New Bedford, Mass.—Bids will be received May 2 by Sidney Lees, Chmn. Bldg. Com., for furnishing material and erecting a new club building for the Washington Social and Musical Club, at W. French Ave. and Cove St.; probable cost, $50,000. Saml. C. Hunt, Archt., Odd Fellows Bldg.

South Gardner, Mass.—The L. B. Ramsdell Co. is to erect an addition to its factory, but is not going to put in any extra power.

Boston, Mass.—The Directors of the Shawmut Bank, it is stated, have selected the plans submitted by Winslow & Bigelow, 3 Hamilton Pl., for the building to be erected at Devonshire, Water and Congress Sts.

Hampden, Mass.—F. R. Richmond, 115 State St., Springfield, it is stated, has prepared plans for the Odd Fellows Bldg., which is to be erected on Pynchon St., at a probable cost of $75,000.

Worcester, Mass.—It is reported that the erection of a union station here, the cost of the building alone to be about $350,000, is under consideration.

Minneapolis, Minn.—T. B. Walker, it is stated, is contemplating the erection of an 8-story office building, at 8th St. and Hennepin Ave., to be used by physicians and surgeons.

Wm. Deering is to erect a 10-story brick fire proof office building at 405-9 2nd Ave. S., to cost $500,000. Archts., Long & Long, 830 Hennepin Ave.

Sedgwick & Saxton, Lumber Exchange, have prepared plans for a brick addition to office building on Hennepin Ave. and 5th St., for the Consolidated Land Co., to cost $50,000.

*J. & W. A. Elliott, Lumber Exchange, it is stated, have received the contract to erect the building for the Boyd Transfer Co. on Lake St. and 4th Ave. S. at a cost of $44,950.

St. Paul, Minn.—Deebach Bros. are to erect a 2-story brick building on S. 4th and Jackson Sts. to cost about $20,000.

Thief River, Minn.—S. Graves, of Minneapolis, it is reported, is preparing to erect a $40,000 hotel here.

Duluth, Minn.—A. Terryberry, Palladio Bldg., it is stated, has prepared plans for a $25,000 hotel which is to be erected at Park Point.

St. Louis, Mo.—Eames & Young, Chestnut and 7th Sts., it is stated, are preparing plans for a 12-story addition to the Frisco Bldg., to cost approximately $250,000.

Fremont, Neb.—The erection of a Y. M. C. A. building at a cost of $30,000 is reported under consideration.

Omaha, Neb.—The Y. M. C. A. is reported to have purchased property at 17th and Harvey Sts., on which it contemplates erecting a building to cost $200,000. Fisher & Lowrie, Archts.

South Omaha, Neb.—The Packers Nat. Bank, of South Omaha, has decided to construct a new 2-story bank, to cost $35,000. J. E. Dietrich, Archt., Ramge Bldg., Omaha.

New York, N. Y.—A Committee has been appointed by the Building Trades Employers' Assoc. to prepare plans for a $1,000,000 building which is to be erected as a home for the Assoc. The Com. is to report at the next semi-annual meeting.

Oswego, N. Y.—Plans are being prepared for a new building for the Ontario Telephone Co.

Schenectady, N. Y.—It is reported that a $300,000 union depot is to be erected here this summer by the N. Y. Central & Hudson River R. R. (H. Fernstrom, Ch. Engr., N. Y. City).

Troy, N. Y.—It is reported that F. F. Proctor is planning to erect a theater here to cost about $250,000.

It is reported that the Rand House is to be remodelled at a cost of $60,000.

Oneida, N. Y.—C. H. Oaks, it is stated, has been appointed a member of a committee to investigate the proposition to erect an opera house here at a cost of about $25,000.

Elizabeth City, N. C.—The officials of the Suffolk & North Carolina Ry. (J. C. Causey, Jr., Ch. Engr., Suffolk, Va.), it is reported, is contemplating the erection of a new passenger station here.

Winston-Salem, N. C.—The members of the Bd. of Trade, it is reported, are considering the erection of a hotel to cost about $100,000.

Cincinnati, O.—The following are reported to be the bids received, Apr. 3, by the Cincinnati Southern Ry., 57 Ingalls Bldg. (Stanley Ferguson, Secy.), for erecting brick and concrete terminal buildings at Vine, Plum, Commerce and Front Sts.: Collier Bridge Co., Indianapolis, $191,165; Broderick & Wind Co., St. Louis, $191,500; L. P. Hazen & Co., Cincinnati, $197,950; Pittsburg Constr. Co., $205,000; H. Harrig & Co., Cincinnati, $206,800; Ferro Concrete Constr. Co., Cincinnati, $210,746; T. E. Hill Co., Chicago, $213,529; A. C. Schillinger & Bro., Chicago, $221,497; Patrick Farrell, $227,970; W. H. Ellis Co., Cincinnati, $242,360; Herman Probst Co., New York, $250,644; William Miller & Sons, Cincinnati, $270,380; J. D. Fitzgibbons, St. Louis, $293,000; B. H. Lichter & Co., Chicago, $303,000.

The Directors of the Citizens Natl. Bank are about to have plans prepared for a 5-story building.

**Items marked thus give the names of parties awarded contracts.*

Piqua, O.—The Odd Fellows, it is stated, have formed the Co-operative Bldg. Society of Odd Fellows, with a capital of $100,000, and will probably in the near future erect a building to cost about $45,000.

Findlay, O.—D. Kirk, Son & Co., it is reported, have engaged Geo. Horn to prepare plans for their 3-story brick building which they propose erecting on E. Sandusky St.

Dayton, O.—Frank M. Andrews, Conover Bldg., it is stated, has prepared plans for an auditorium which is to be erected by the Natl. Cash Register Co., at a cost of about $400,000. The Natl. Cash Register Co., it is stated, is also contemplating the erection of an office building at Main and Brown Sts.

E. L. Shuey, Pres. Y. M. C. A., writes that the proposed Y. M. C. A. building will cost about $350,000. Contracts will probably be let late in the spring. Architects, Peters, Burns & Pretzinger, Dayton.

Columbus, O.—Henry Maetzel & Co., 284½ S. High St., it is reported, have been engaged to prepare plans for a 3-story business and apartment building to be erected on E. Long St. for J. D. Osborn at a cost of $35,000.

Canton, O.—Guy Tilden, Schaefer Blk., has prepared plans for a 4-story brick and stone business building for H. R. Jones, to be erected on 7th and Piedmont Sts., to cost $25,000.

New Kensington, Pa.—The Y. M. C. A. is reported to be receiving bids for the erection of a $30,000 building.

**Bryn Mawr, Pa.*—The Chas. McCaul Co., 10 N. 11th St., Philadelphia, Pa., it is reported, has received the contract to erect a 3-story brick and stone exchange for the Bell Telephone Co.

**McKeesport, Pa.*—E. D. Huey, it is reported, has secured the contract to erect an addition to the Union Natl. Bank in 5th Ave. at a cost of $25,000.

**Reading, Pa.*—It is reported that the Chas. McCaul Co., of Philadelphia, has received the contract to erect a group of shops here for the Philadelphia & Reading Ry. Co., at a total cost of $100,000.

**Philadelphia, Pa.*—A building permit has been granted to J. V. McCloskey, 211 New St., to erect a 3-story brick hall at 747 S. 3d St., at a cost of $20,700. A permit has also been granted to Wm. Steele & Sons, 1600 Arch St., to erect a 2-story brick warehouse on American St., for the Model Heating Co., cost $20,000.

Knoxville, Tenn.—It is reported that about May 1 the contract for erecting the 10-story steel bank and office building for the Mechanics' Natl. Bank will be awarded. Appropriation, $200,000.

Houston, Tex.—W. L. Macatee & Sons propose erecting a concrete warehouse on railroad track, and will be pleased to hear from manufacturers of elevators, conveyors, etc., adapted to their line of business.

Ft. Worth, Tex.—A. B. Wharton, it is reported, has purchased a site at 7th and Throckmorton Sts., and will erect a brick building at a cost of $50,000.

**Salt Lake City, Utah.*—McDonald & Son, of Salt Lake City, have secured the contract for erecting the Herald Building at 173 Main St., at a cost of about $100,000. Archt. J. C. Craig, David Keith Bldg.

Richmond, Va.—It is stated that A. F. Hunt, 1301 E. Main St., has prepared plans for a 4-story brick building which is to be occupied by Wilkinson, Williams & Reed as a wholesale dry goods store. Probable cost, $25,000.

**Coeur d'Alene, Wash.*—P. L. Peterson, 2220 Bridge Ave., Spokane, it is reported, has received the contract to erect the Coeur d'Alene Inn, at a cost of about $40,000.

Milwaukee, Wis.—The Milwaukee Bridge Co. proposes erecting a 72x130 ft. extension to its main shop, principally for storage purposes. No new machinery or power plant will be required.

Kirchhoff & Rose, 201 Grand Ave., it is reported, have prepared plans for a 6-story store and office building to be erected by Alfred Uihlein at 2d and Sycamore Sts., at a cost of $300,000.

Plans have been prepared by Kirchhoff & Rose, 201 Grand Ave., it is reported, for a vaudeville theater which is to be erected at 4th and Sycamore Sts., and to be known as the Orpheum. Probable cost, $200,000.

Winnipeg, Man.—Geo. Wright & Co., owners of the Brunswick Hotel, it is stated, are contemplating remodeling the hotel at a cost of about $40,000.

The Knights of Pythias, it is reported, are contemplating the erection of a building at a cost of $25,000.

Monterey, Mex.—Alfred Giles, of San Antonio, has prepared plans for additions to casino to cost about $25,000.

Chihuahua, Mex.—Alfred Giles, of San Antonio, Tex., has prepared plans for a 3-story store house to be erected here for Don Luis Terrazas, to cost $50,000.

Montreal, Que.—A building permit has been issued for a 7-story office building at St. Catherine and Windsor Sts., at a cost of about $100,000. A. F. Dunlop, 185 St. James St., is the archt.

CHURCHES AND DWELLINGS.

Notes Arranged Alphabetically by States.

Little Rock, Ark.—The Arkansas Presbyterian Church, it is stated, is contemplating the erection of a new edifice at a cost of $25,000. Address Pastor.

Pasadena, Cal.—The members of the First Presbyterian Church, it is reported, are contemplating the erection of a new edifice at a cost of $100,000. Rev. Malcolm McLeod, Pastor.

Greenwich, Conn.—Wm. G. Rockefeller, it is stated, is planning to erect a $700,000 residence here next year.

Colorado Springs, Colo.—Francis T. F. Lovejoy, of Pittsburg, Pa., it is reported, intends erecting a marble residence here to cost about $1,000,000.

Denver, Colo.—Kittridge & Graham, it is stated, contemplate erecting a 2-story brick apartment house on W. 13th and Evans Sts., to cost $40,000.

Chicago, Ill.—Bishop & Co., 113 Adams St., have made plans for 2 apartment buildings to be built in the Hyde Park district for Simon Straus. One will be erected at 6602 Washington Ave. and the other at 294-300 66th St. The total cost is estimated at $58,000.

Plans are being prepared by L. M. Mitchell, 145 La Salle St., for a 3-story apartment house to be erected by Geo. C. Watts at Vincennes Ave. and 44th St., to cost $100,000.

Jos. Molitor, 160 Washington St., has completed plans for a church to be built on 50th St. and Seeley Ave., for St. Mary's Greek Catholic Slavonian congregation, the Rev. John Parscouta pastor. The structure will be of impervious brick and Bedford stone on concrete foundation, 60x125 ft., with tower 135 ft. high. The cost will be about $75,000.

F. V. Newell, 78 La Salle St., has made plans for a 3-story building, 124x115 ft., which is to be built on Sheridan road and Wilson Ave., for Geo. W. Stewart, at a cost of $75,000.

J. B. Waller will improve a site fronting on North State, Schiller and Astor Sts., with a fireproof apartment house, for which Jas. Gamble Rogers, Ashland Blk., is now preparing plans. The building will be 6 stories high, and cost $150,000.

Indianapolis, Ind.—The plans submitted by O. D. Bohlen, Majestic Bldg., it is reported, have been approved by the Bldg. Com. of the Methodist Church. The new edifice is to be erected at Meridian and St. Clair Sts. and is to cost about $11,000.

Plymouth, Ind.—The members of the M. E. Church, it is reported, propose erecting a $20,000 edifice. C. W. Metsker, Pastor.

Hopkinsville, Ky.—John G. Ellis, it is stated, is having plans prepared for a 2-story apartment house which he intends erecting on Clay St. at a cost of $20,000.

Lexington, Ky.—Bids will be received by R. G. Elliott, 143 N. Limestone St., until Apr. 27, for erecting the Upper St. Baptist Church, the work to include excav. and masonry; brick work, cut-stone work, carpentry, electric wiring, plumbing, etc. Anderson & Faig, Consulting Engrs., Mechanical Engr. Dept., Ky. State College.

**Annapolis, Md.*—John W. Emery, it is stated, has received the contract to erect a church for the College Ave. Baptist congregation at about $30,000. Isaac Pursell, 119 S. 4th St., Philadelphia, Pa., is the archt.

Worcester, Mass.—Fuller & Delano, 452 Main St., have prepared plans for a brick apartment house for Dr. J. J. Brennan, to cost $35,000.

St. Paul, Minn.—A permit has been issued for a stone edifice for the Unity Church of St. Paul, to be erected on Portland Ave. and Grotto St., to cost $28,000.

**Minneapolis, Minn.*—Wondersee & Moxley, it is reported, have received the contract to erect an apartment house for F. Schreyer, at 714 5th St. S., according to plans prepared by Boehme & Cordella, Kasora Bldg. It is to be a 4-story and basement structure and to cost about $20,000.

Kansas City, Mo.—G. W. Smith will erect brick apartment houses at 1401-9 E. 10th St., at a cost of $35,000.

The Holmes St. M. E. Church will erect a brick edifice on Holmes St. and Admiral Boule. at a cost of $25,000.

Omaha, Neb.—It is reported that the members of the 10th St. M. E. Church propose erecting a $20,000 edifice.

Jersey City, N. J.—It is stated that the members of the Salem Baptist Church have selected plans and intend erecting a new brick edifice at Union St. and Jackson Ave. to cost $20,000.

Brooklyn, N. Y.—The Trus. of the 6th Ave. M. E. Church, it is reported, have decided to erect a new edifice and parsonage, the total cost not to exceed $52,000.

Syracuse, N. Y.—It is reported that the congregation of the South Presbyterian Church has decided to erect a new edifice at a cost of $35,000. Rev. M. Howland, Pastor.

Dayton, O.—Chas. I. Williams, Callahan Blk., it is reported, is the archt. for an apartment house which is to be erected by the Bellevue Apartment Co., at a probable cost of $100,000.

Cleveland, O.—J. Milton Dyer, Cuyahoga Bldg., it is reported, is the archt. for the new brick edifice which is to be erected for the Wildemere Presbyterian Congregation at a cost of about $40,000. Rev. C. L. Zorbaugh, Pastor.

Oklahoma City, Okla. Ter.—It is reported that the members of the South Methodist Church are contemplating the erection of a new edifice at a cost of $60,000.

Philadelphia, Pa.—Milligan & Webber, 520 Walnut St., it is stated, have prepared plans for a 4-story brick and stone apartment house to be erected at 45th and Walnut Sts., W. Philadelphia, at a cost of $75,000.

**Pittsburg, Pa.*—Thos. Reilly, of Philadelphia, it is reported, has received the contract to erect St. Andrew's Church in the East End at about $96,000.

Memphis, Tenn.—Col. Wm. H. Carroll, it is stated, is contemplating the erection of a $100,000 apartment house at 3d and Court Sts.

**Waxahachie, Tex.*—E. S. Boze, of Waxahachie, it is stated, has received the contract to erect the Methodist Church at a cost of $17,850.

Norfolk, Va.—A company has been organized with Chas. McIntosh as Pres. and a capital of $50,000 for the purpose of erecting an apartment house on Boush St.

**Sheboygan, Wis.*—A. Donald, of Ashland, it is stated, has received the contract to erect a residence for Peter Reiss at a cost of about $40,000.

Chihuahua, Mex.—Alfred Giles, San Antonio, Tex., has prepared plans for 6 residences for Don Enrique C. Creel, to cost in all about $50,000.

SCHOOLS.

Notes Arranged Alphabetically by States.

East Lake, Ala.—Pres. A. P. Montague, of Howard College, it is reported, has announced that a $20,000 dormitory is to be erected at the college in the near future.

Phoenix, Ariz.—Bids will be received May 9 by F. E. Leupp, Comr. Indian Affairs, Dept. of Interior, Washington, D. C., for furishing materials and constructing, plumbing and electric wiring a brick farm house at the Phoenix School; C. W. Goodman, Supt.

Sacramento, Cal.—Local press reports state that the Bd. of Educ. has decided to receive plans until May 11 for a 15-room school to be erected at 4th and Q Sts. at a cost of $35,000.

**Bridgeport, Conn.*—The following contracts, it is stated, have been awarded for erecting a school on Newfield Ave. (bidders all of Bridgeport): The W. P. Kirk Co., plumbing; Van Stone & Van Stone, carpenter work; Samuel Dawe, painting; the H. M. Purdy Co., mason work. The contracts aggregate $35,101.

Loveland, Colo.—The citizens of School Dist. No. 2, it is reported, have voted in favor of issuing $20,000 bonds to erect a school to replace the structure which was destroyed by fire.

**Freeport, Ill.*—E. Graham, Sec'y Bd. Educ., writes that Hamyln Bros., of Freeport, have secured the contract for erecting a grade school (bids opened Mar. 10) for $22,520, and Allen, Son & Co., of Peoria, have secured the contract for erecting an addition to the high school (bids opened Apr. 7) for $32,900. The Evans Plumbing & Heating Co., of Freeport, it is stated, secured the contract for the plumbing and heating of both buildings at $8,149.

Galesburg, Ill.—Andrew Carnegie, it is stated, has given $50,000 to Knox College to erect a science hall, on condition that a like sum is raised as an endowment fund.

Westfield, Ind.—A high school is to be erected here at a cost of $20,000.

Liberty, Ind.—The School Bd., it is stated, intends erecting an addition to the school at a cost of $12,000.

Des Moines, Ia.—Bids will be received May 13 by Theo. F. Grefe. Pres. Bd., for furnishing material and erecting a 2-story and basement school for the Independent School Dist. of W. Des Moines.

Fairfield, Ia.—It is reported that bids are wanted May 4 for erecting an 8-room school. J. W. Dole, Secy., School Bd.

Iowa City, Ia.—The following are reported to be the bids opened Apr. 13 by the Bd. of Regents of the Iowa Univ. for erecting the Engineering Building: William Grace Co., Chicago, Ill., $50,900; W. G. Birdsall, Perry, Ia., $61,800; B. Jobst & Sons, Peoria, Ill., $64,450; James Rowson & Son, Iowa City, $64,500; Bartlett & Kling, Cedar Rapids, $65,641; H. Allenberger & Co., Chicago, Ill., $69,552; G. W. Nichols & Co., Des Moines, $70,131. This is for the first wing of the building, 71x123 ft., to be constructed of Bedford stone.

*W. J. McChesney, Secy. Bd. of Regents, writes that the contract for the above building was on Apr. 13 awarded to Wm. Grace Co., of Chicago, Ill., for $59,900.

Shreveport, La.—It is reported that bids are wanted May 1 for erecting an 8-room school in Caddo Parish. Address N. S. Allen, Archt., Shreveport.

Baltimore, Md.—Bids will be received Apr. 26 by the Bd. of Awards (E. Clay Timanus, Pres.) for erecting an addition to building at Ramsey and Pulaski Sts., for the use of the Bd. School Comrs.

Chestertown, Md.—It is reported that plans have been accepted for a building at Washington College to cost $30,000.

**Springfield, Mass.*—W. A. Ford, Chmn. City Property Com., writes that the contract for horizontal boilers and a ventilating and heating plant, including motors (bids opened Apr. 12) in the Tech. High School, has been awarded to Evans-Almirall Co., of New York, N. Y., for $26,900.

The Council has passed the order authorizing the fireproofing of the Technical High School at a cost of $23,000.

Needham, Mass.—Plans, including estimates, will be received by Wm. P. Bailey, Clk. of Com. on Avey School, P. O. Box 340, Boston, for a 4-room red brick grammar school, or a 3 or 4-room addition to a 6-room wooden school.

Whitinsville, Mass.—Peabody & Stearns, of Boston, it is stated, are preparing plans for a high school which is to be erected here at a cost of $80,000.

Fall River, Mass.—Louis G. Destremps & Son, Bennett Blk., have prepared plans for a school for St. Joseph's Church, to cost $35,000.

Boston, Mass.—The following are the 3 lowest bids opened on Apr. 17 by the Schoolhouse Comn. for the erection of a 9-room brick, fireproof, primary, 3-story school on Howard Ave., Dorchester Dist.: Whiton & Haynes Co., $55,862; P. H. Jackson, $58,096, and Henry McGahey, $58,499.

Westfield, Mass.—The erection of
to the high school at a cost of $3
ported under consideration.

Holland, Mich.—Andrew Carnegie,
has offered $20,000 to Hope Colle
a graduation hall and gymnasium, pro
sum is raised for maintenance.

Norway, Mich.—Bids will be rece
by the Bd. of Educ. (L. F. Springer,
furnishing and erecting 5 fire esc
schoolhouses. Charlton & Kuenzli, A
quette, Mich.

Port Huron, Mich.—It is reporte
School Bd. is contemplating the er
school at a cost of $20,000.

Minneapolis, Minn.—The City C
passed an ordinance authorizing the sa
000 bonds for the erection of schools

Webster Grove, Mo.—The citizens
in favor of issuing $40,000 bonds
high school and make inprovements
Orchard School.

Emerson, Neb.—The School Dist.
to issue $20,000 bonds to erect a sch

Hookset, N. H.—It is reported
John B. Delaney will erect academ
at Hookset. Archt. not yet selected.

Zuni, N. Mex.—Bids will be rec
11 by T. E. Leupp, Comr. of Indian Af
of the Interior, Washington, D. C.
nishing materials and constructing a
at the Zuni School. D. D. Graham, S

Omaha, Neb.—The Bd. of Educ., it
ed, is considering the erection of a 4-
tion to the Madison and Corrigan S
total cost to be about $25,000.

**Santa Fe, N. M.*—St. John &
Colorado Springs, Colo., it is reported
ceived the contract for the heating,
and ventilating apparatus for the high

Albuquerque, N. Mex.—Bids will b
May 8 by T. E. Leupp, Comr. of India
Dept. of the Interior, Washington, D
furnishing materials and constructing
laundry building, including plumbing
Albuquerque School. Jas. K. Allen,

Salem, N. J.—Bids, including plans
received May 11 by the Bd. of Educ
Jackson, Secy.) for erecting a 10-room
brick school on the High School grou
present building to be removed) at a
to exceed $28,000, including ventilating
ing.

Englewood, N. J.—Taylor & Mosley,
St., N. Y. City, it is stated, have been
to prepare plans for the $75,000 scho
it is proposed erecting on the Engle St

New York, N. Y.—Plans have been
a 3-story brick and stone school to be e
505 E. 16th St., at a cost of $20,000
Congregation of St. George's P. E.
H. H. Tyson, Archt.

*Jos Ohlhausen, 257 Stockholm St.,
has secured the contract for erecting
porary school on southerly side of M
approach to Williamsburg Bridge (bids
Apr. 17) for $14,441.

Brooklyn, N. Y.—Bids will be recei
May 1 by C. B. J. Snyder, Supt. Schoo
N. Y. City, for new iron stairways, alt
repairs, etc., at Schools Nos. 13, 30,
39, Boro. Brooklyn.

**Long Island City, L. I., N. Y.*—The
ing are the bids opened on Apr. 10 b
J. Snyder, Supt. School Bldgs., N. Y.
additions and alterations to schools in t
of Queens: (*a*) School No. 17, (*b*) Sch
49: Chas. Wille, 39 E. 42d St., N.
c, $22,722 (awarded contract); *b*, $27,9
MacArthur, 22 Ormond Pl., Brooklyn,
733, *b*, $23,993 (awarded contract); W
ner, *a*, $32,587; Tolmie & Kerr, *a*, $28,7
Ohlhausen, *a*, $27,244, *b*, $27,382.; Rich
man, *b*, $32,000; J. E. Anderson, *b*,
Wm. Horne Co., *b*, $29,800.

*Bids were opened same time and pl
ventilating and heating the above buid
School No. 17; *b*, School No. 49: J
Petry, 63 Vernon Ave., *a*, $9,722 (awa
tract), *b*, $7,100 (awarded contact); Wm
vany, *a*, $9,872 (informal), *b*, $7,216; J
ran Mfg. Co., *a*, $10,750, *b*, $9,000; W
Chambers, *a*, $9,890, *b*, $8,290; E. Rutz
a, $10,511, *b*, $8,666; Wm. Horne Co., *b*,
Rossman & Bracken Co., *b*, $8,115.

Poughkeepsie, N. Y.—The Bd. of E
is stated, has decided to have the Bldg
receive plans and specifications for a sc
cost about $30,000.

Binghamton, N. Y.—The Bd. of Edu
accepted the plans of H. Sumner Gardner,
man Bldg., for the school which is to be
on Robinson St. at an estimated cost o
000. The plans provide for a 3-story bri
stone structure with a 2-story wing on
side.

Ticonderoga, N. Y.—T. W. Rogers, of
don, N. Y., it is reported, submitted th
est bid for erecting a school at $50,44
including ventilating and heating. The
bid for the ventilating and heating is re
to be $5,000. The appropriation for the
ing was $45,000 and the School Bd.,
stated, has decided to ask for an addi
$20,000.

Carthage, N. Y.—The plans of D. D. Ki
Watertown, it is stated, have been accepte
a 10-room school which is to be erected i
Carthage at a cost of $30,000. Bids are
to be asked for erection of same.

Henderson, N. C.—At the election held
11 the citizens are reported to have vot
favor of erecting a graded school at a
of $20,000.

**Items marked thus give the names of parties awarded contracts.*

zon, O.—H. R. Dittmer, Clk. Bd. Educ.,
hat the citizens voted Mar. 30 to issue
bonds for erecting an extension to a

nville, O.—Bids will be received May
e Bd. of Educ. (And. Forsythe, Clk.)
ting an addition to the Lincoln Bldg.

rforce, O.—Bids will be received May
. A. Galloway, M. D., 108 W. Main St.,
Pres. Bd. Trus., for furnishing material
ting the industrial building and assembly
the Normal and Industrial depts. at
orce Univ. D. Rieble & Sons, Archts.,
Blk., Columbus.

Palestine, O.—The erection of an 8-room
hool at a cost of $19000 is reported under
ation.

rville, O.—It is reported that plans are
repared at once for a young women's
at Otterbein Univ., for which $25,-
been given by Mrs. Sarah B. Cockran,
Pleasant, Pa.

nati, O.—It is stated that the Trus. of
rew Union College are considering the
of the building and improvements at a
st of about $100,000.

land Heights, O.—Bids will be received
by the Bd. of Educ. (Wm. G. Phare,
2 American Trust Bldg., Cleveland) for
ng material and erecting a 4-room brick
on Roxboro Road. Geo. F. Hammond,
166 Euclid Ave., Cleveland.

land, O.—It is reported that Archt. W.
dges, Rose Bldg., has completed plans
parochial school for the St. Francis con-
n and is ready to receive bids. It will
ories, brick, contain 14 rooms, steel and
f construction, steam heat and modern
g.
School Bd. is reported to be considering
e of $200,000 bonds for school improve-

n, O.—The proposition to issue $35,000
Lorain school bonds is reported to have

will be received by the Bd. of Educ.
Hopkins, Clk.) until May 22, for $47,000
bonds.

elyn, O.—Bids will be received May
. F. Schnabel, Clk. Bd. Educ., South
n Village School Dist., P. O., Brook-
$21,000 school bonds.

esbarre, Pa.—A. W. Moss, Clk. School
ites that the contract for ventilating and
the Courtright School Bldg. (bids
Apr. 3) has been awarded to B. G. Car-
& Co., of Wilkesbarre, for $4,039.

delphia, Pa.—It is stated that repairs
be made to the Boys' High School, which
cently damaged by fire, at a cost of

man Voight, it is stated, has received
tract to erect a parochial school for the
atius R. C. Church at 43d and Wallace
be a 3-story brick and stone structure,
ft. and to cost about $25,000. A. W.
Bethlehem, is the archt.

stown, Pa.—A committee has been ap-
by the congregation of St. Joseph's Ger-
atholic Church to have charge of the erec-
a school to cost about $35,000. John
is Chmn. of the Com.

burg, Pa.—Bids will be received Apr.
the Dirs. Morse Sub-School Dist., Sarah
outh 24th Sts. (John G. Coates, Pres.)
ecting a school on the grounds adjoining
esent school. Probable cost, $50,000.
Bros., Archts., Lewis Bldg.

oryville, Pa.—The Directors of Key-
Academy, it is reported, have decided to
50,000 for the erection of a gymnasium
provements to the college.

Liberty, Pa.—Bids will be received Apr.
the Bd. of Educ. (Chas. J. Becker, Pres.)
ecting a 4-room addition to the present
Louis O. Brosie, Archt., 407 Vilsack
Pittsburg.

outh, Pa.—School bonds amounting to
have been sold.

ence, S. C.—The citizens, it is reported,
decided to erect a school at a cost of

tanburg, S. C.—The citizens, it is stated,
oted in favor of issuing $30,000 school

nberlain, S. D.—Bids will be received
o by F. E. Leupp, Comr. Indian Affairs,
of the Interior, Washington, D. C., for
ing materials and constructing a brick
l and frame employe's quarters, each in-
plumbing, steam heat and acetylene gas
and a frame work-shop, including plumb-
d acetylene gas piping, and extension of
and sewer systems at the Chamberlain
John Flinn, Supt.

tanooga, Tenn.—Bids will be received
6 by the School Comrs. of the 6th Civil
(Chas. Engers, Secy.) at the office of
Adams, Rm. 33, Chamberlain Bldg., for
g and heating Sherman Heights High

phis, Tenn.—The Senate has passed a
thorizing the issue of $125,000 bonds for
largement of the schools. It is stated
is probable that 5 new schools will be
d.

ston, Tex.—It is stated that the Bd. of
Trus. has decided to reject all bids re-
Apr. 10 for erecting the 5th Ward School
have the plans modified so as to bring
st within the appropriation, which is $20,-

chburg, Va.—The Common Council has
d a resolution appropriating $25,000 for
ection of a school in Rivermont.

Charlottesville, Va.—John D. Rockefeller, it is reported, has given the Univ. of Virginia $100,000 to found a school of education to be called the Curry Memorial School of Education.

McMechen, W. Va.—The Bd. of Educ. of Union Dist., it is stated, has sold $50,000 school bonds.

Milwaukee, Wis.—Archts. Buemming & Dick, Pabst Bldg., writes that they will be ready in about 2 weeks to receive figures on the North Division High School.

The Senate has passed a bill authorizing the appropriation of $240,000 for the purchase of a site and the erection of a normal school here.

Chippewa Falls, Wis.—Plans of Chandler & Park, of Racine, it is stated, have been adopted for a school to be erected at a cost of $30,000.

Prattville, Wis.—It is stated that the Senate has appropriated $115,000 for the erection of a school here.

Phillips, Wis.—It is reported that the School Bd. contemplates the erection of a $25,000 school.

New Richmond, Wis.—Bids will be received until Apr. 27 by O. W. Mosher, Chmn. Bldg. Com., for erecting a high school. Separate bids will be received for the ventilating and heating, plumbing and electric wiring.

Regina, N. W. Ter.—Bids are wanted May 1 for erecting a 12-room solid brick and stone school. J. Rigby, Sec.-Treas. Regina Pub. School Dist., Pettingell & Van Valkenburg, Archts., Regina.

STREET CLEANING AND GARBAGE DISPOSAL.

Notes Arranged Alphabetically by States.

Los Angeles, Cal.—Roderick McKay, 922 E. 12th St., has been named by the Chamber of Commerce, the Municipal League and the Merchants and Manufacturer's Assoc., as their choice to go east and investigate systems of garbage destruction there in operation for the city of Los Angeles and to report the result of his investigations to the Council on his return.

Peoria, Ill.—A committee is stated to have been appointed by Council, consisting of Messrs. Long, Thompson and Sutliff, to look into the matter of constructing a garbage crematory.

Dayton, O.—Bids will be received Apr. 28 by Wm. Miller, Clk. Bd. Pub. Service, for sprinkling portions of numerous streets.

Panama.—See "Miscellaneous."

Montreal, Que.—See "Public Buildings.'

NEW INDUSTRIAL PLANTS.

See also Business Buildings.

The Dimmick Mfg. & Lumber Co., Appleton, Wis., expects to build a factory within sixty days.

Loeffelholz & Co., Milwaukee, Wis., are erecting a 30x80-ft. brass foundry addition to their plant. Power will be furnished from the main plant.

The Boiling Pot Concentrator Co., Wichita, Kan., expects to erect a plant, involving an expenditure of $100,000 for buildings and machinery, in one of the larger western cities. The plant will include a thoroughly equipped foundry for large work, a machine shop equipped with iron-working machinery, a pattern shop, and a construction shop where boiler work and structural steelwork can be handled. Forrest McKinley, Gen. Mgr.

The Automobile Dept. of the White Sewing Machine Co., Cleveland, O., has purchased a factory site and will sooner or later build on it, but the nature and extent of the plant has not been decided.

The Bay State Metal Wheel Co., East Templeton, Mass., contemplates erecting a new plant, but details have not been decided. If the plant is built, two 100-h.p. boilers and a 100-h.p. engine will be required.

Brown Bros., Second Ave. and Washington St., Spokane, Wash., manufacturers of steam boilers, roofing and cornices, will erect a 2-story 70x90-ft. brick and stone building to replace one recently burned. The capacity of the power plant has not yet been decided.

The Peru, Ind., Canning Co. will erect a plant to include a 2-story 96x192-ft. warehouse, a 3-story machine shop 48 ft. square, a 40x90-ft. calcium room, 40x192-ft, shucking shed, and a 40x116-ft. boiler room. Pliny M. Crume, Secy. and Treas.

M. H. McCabe, Supt. and Traffic Mgr., Mississippi Central R. R. Co., Hattiesburg, Miss., writes that plans regarding new shops are not sufficiently developed to give dimensions and capacity of power plant, but this information will probably be available within 60 days.

The Des Moines, Ia., Bridge & Iron Wks. will erect a 60x90-ft. foundry.

J. A. Haynes, Muskogee, Ind. T., is considering the erection of a brick plant, but the matter has not been decided.

W. B. Woody, Rockdale, Tex., owns 506 acres of lignite coal and wishes to erect a briquette plant with a daily capacity of 100 tons. He wishes to correspond with makers of briquetting machines.

The Mesta Machine Co. has had plans prepared for additions to its plant at West Homestead, Pa., which will double the capacity at an expenditure of about $500,000, according to local press reports. It is stated that work on the foundation will be begun early in May.

The Charles McCaul Co., Philadelphia, Pa., has been awarded a contract by the Philadelphia & Reading R. R. for the construction of extensive additions to the company's locomotive shops in Reading, according to local newspaper reports. It is stated that several buildings will be erected and the facilities for repairing locomotives greatly increased. The cost of the work is estimated as close to $100,000.

The Worcester, Mass., Pressed Steel Co. will erect a 2-story, 90x200-ft. factory building, according to local press reports.

The Alabama Coffin & Casket Co. has been incorporated with a capital of $50,000, and will erect a factory in North Birmingham, Ala., according to local newspaper reports. A. M. Russell, North Birmingham, Secy. and Treas.

The Imperial Co., Norfolk, Va., contemplates erecting a sulphuric acid chamber and an acid phosphate plant the coming season. About 150-h.p. boiler and engine capacity and grinding and mixing machinery will be required.

The Westmoreland Rubber Mfg. Co., Grapeville, Pa., is about to erect a 2-story, 50x100-ft. steel and concrete building. The power plant will include a 350-h.p. heavy duty engine to run rolls and other machinery.

The Duffy Silk Co., 1228 Broadway, Buffalo, N. Y., will erect a 3-story, 50x200-ft. brick factory building, according to local press reports.

The Michigan Ice & Cold Storage Co., Detroit, Mich., will erect an 8-story, 204x164-ft. plant, according to local press reports. Field, Hinchman & Smith are stated to be the architects.

The Potthoff & Frey Iron Works, Cincinnati, O., have secured a permit to erect a steel manufacturing plant on Front St., to cost $18,000, according to local press reports.

The Gendron Iron Wheel Co., Toledo, O., will build an addition to cost about $25,000, according to local press reports.

The Warren Construction Co. will erect an asphalt plant in Tacoma, Wash., according to local press reports. W. E. Hacker is stated to be the Tacoma agent of the company.

The Flagler Iron & Steel Co., Chicago, Ill., is having plans prepared for the erection of a steel plant near Rondout, Ill., at an estimated cost of $1,000,000, according to local press reports.

A permit has been granted to E. C. Andrews, of the Liberty Mills, Nashville, Tenn., to erect an elevator to cost $20,000, according to local press reports.

The Standard Milling Co., 49 Wall St., New York, will erect a flour mill at Kansas City, Mo., to have a daily capacity of 2,000 bbl.

A 2-story brick addition to cost $10,000 is to be built to the plant of the Hendrie & Bolthoff Mfg. Co., Denver, Colo., according to local newspaper reports. It is stated that additional machinery to cost about $50,000 will be installed.

The James Demarest Stove & Heating Co., Binghamton, N. Y., has been granted a permit to erect a new plant, the main building of which will be 3 stories, 250x150 ft., according to local press reports.

A 4-story, 53x145-ft. brick textile plant will be erected by M. Ward Easby, engineer, in Jasper St., near Orleans St., Philadelphia, Pa., for Jos. Lomax, according to local newspaper reports. There will also be a boiler and engine house of 150-hp. capacity.

The American Salt Mfg. Co., Philadelphia, Pa., will erect two buildings at its plant at Weccacoe & Ritner Sts., according to local newspaper reports. They will be of structural steel, each 48x160 ft., and cost $45,000.

R. B. Gordin, Irwin, O., will erect a 5,000-bu. grain elevator and install a 35-hp. gasoline engine.

The Sherman Envelope Co., Worcester, Mass., will erect a new factory building, to cost about $50,000, according to local newspaper reports.

MISCELLANEOUS.

Notes Arranged Alphabetically by States.

Port Harford, Cal.—Bids will be received by Capt. C. H. McKinstry, Corps Engrs., U. S. A., 518 Bradbury Bldg., Los Angeles, on May 11, for furnishing, delivering and placing in position stone to repair and extend breakwater, now under course of construction at San Luis Obispo Harbor; appropriation available $23,500. Specifications on file at the office of The Engineering Record, 114 Liberty St., New York, N. Y.

Hartford, Conn.—Bids will be received, Apr. 25, by Asabel W. Mitchel, Compt., for rebuilding about 402 lin. ft. of the Park River retaining wall adjacent to the State Capitol grounds.

Wilmington, Del.—Bids will be received Apr. 27 by the Pub. Bldg. Com. of City Council (Jos. E. McCafferty, Chmn.) for dredging at ft. of Front and Church Sts.

Washington, D. C.—Bids will be received May 9 at the Bureau Supplies and Accounts, Navy Dept., Washington, for furnishing at the Navy Yard, Pensacola, Fla., and the naval stations, Key West, Fla., and New Orleans, La., a quantity of naval supplies, including Portland cement, gravel, sand, roofing tile, ventilators, gutters, tool steel, etc.; also May 23 for furnishing at the Navy Yards, Portsmouth, N. H.; Boston, Mass.; New York, N. Y.; League Island, Pa.; Norfolk, Va., and Pensacola, Fla., a quantity of machine tools, etc., including engine, lathes, grinders, drills, presses, plate bending and straightening rolls, pipe benders and cutters, molding and slotting machines, boring mill, drills, sawing machine, foundry cupolas, etc., H. T. B. Harris, Paymaster-Gen., U. S. N.

Bids will be received May 17 at the Treasury Dept., Bureau of Engraving and Printing (Wm. M. Meredith, Dir.) for 7 fire escapes.

Washington, D. C.—See "Power Plants, Gas and Electricity."

Savannah, Ga.—Bids will be received by Lieut. Col. Jas. B. Quinn, Corps Engrs., U. S. A., Savannah, May 19, for repairing and raising portions of South Jetty and raising outer end of North Jetty, at Cumberland Sound, Ga. and Fla., as advertised in The Engineering Record.

Chicago, Ill.—Bids will be received by Lieut. Col. W. H. Bixby, Corps Engrs., U. S. A., on May 15 for rock excavation in Calumet River, as advertised in The Engineering Record.

Winnetka, Ill.—Bids will be received Apr. 27 by Mary Busscher, Secy. Bd. Park Comrs., for $22,000 bonds, issued for the purpose of acquiring and improving a public park.

Mt. Vernon, Ind.—Press reports state that bids will be received Apr. 29 by Barker & Zimmerman, Mt. Vernon, for constructing a drainage ditch.

Auburn, Ind.—C. P. Hamman, Engr. in charge, will offer for sale at public outcry on May 11 the contract for the construction of a drain, known as Cedar Creek Drain No. 793, to cost about $40,000, as advertised in The Engineering Record.

Hutchinson, Kan.—Bids will be received May 1 by S. F. Johnson, City Clk., for constructing a drainage canal from Cow Creek to the Arkansas River; length 7,150 ft., width 150 ft. Estimated amount of dirt to be removed 177,810 cu. yds.

Gueydan, La.—Henry L. Gueydan, of Gueydan, La., writes it is proposed to construct a canal to Pecan Island at a cost of $12,000.

Sioux City, Ia.—Local press reports state that according to estimates of City Engr. J. M. Lewis, submitted to the Special Committee, consisting of Aldermen Hanlon, Kerby and Radcliffe, the total cost of the Perry Creek conduit will be about $66,000. The city's share will be $11,000.

Iowa City, Ia.—The Regents of Iowa Univ. are reported to have authorized Prof. Raymond, of the Eng. Dept., to prepare plans and specifications for a dam across Iowa River, 100 ft. above or below the Burlington St. Bridge. Contract will probably be let at the June meeting of the Bd. of Regents.

**Boston, Mass.*—Geo. F. Murdock, Clk., Massachusetts Highway Comn., writes that the contract for furnishing 2,500 bbls. Portland cement (bids opened Apr. 13) has been awarded to Portland Stone Ware Co., 42 Oliver St., for a total of $4,000.

Charlevoix, Mich.—Bids will be received May 10 by Jas. Wilson, Secy., Dept. of Agriculture, Washington, D. C., for laying for the Weather Bureau of this Dept., 35 statute miles of 1 conductor telegraph cable between Charlevoix and Beaver Island, Mich.

**Macon, Mo.*—Carroll & Hummer, of Marion, are reported to have secured a contract for draining at Macon for about $40,000.

Edgewater, N. J.—Bids will be received by Edw. W. Speer, Boro. Clk., on May 2 (readvertisement) for furnishing material and constructing a public pier as advertised in The Engineering Record.

Brooklyn, N. Y.—Bids will be received until May 4 by the Park Bd. (John J. Pallas, Pres.) for furnishing and delivering on parks and parkways in the Boros. of Brooklyn and Queens, limestone and limestone screenings, Hudson River road gravel and trap rock and trap rock screenings.

Bids will be received by the Park Bd. (John J. Pallas, Pres.) for furnishing and delivering North River hard brick, cement and Rockland lime, in parks and on parkways in the Boro. of Brooklyn.

Ellis Island, N. Y. H., N. Y.—Secy. Metcalf, of the Dept. of Commerce and Labor, is reported to have on Apr. 14 awarded the contract for the construction of a new island, to be a part of Ellis Island immigrant station, in New York Bay, to the Jersey Dock & Bridge Building Co., of Elizabeth, N. J.; contract price reported to be $119,000.

St. George, S. I., N. Y.—Bids will be received until May 1 (readvertisement) by Maurice Featherson, Comr. of Docks, N. Y. City, for furnishing material and removing present structures and constructing new structures in connection with the new St. George Terminal and for dredging thereat. This was recently reported as being awarded at a cost of $366,200.

Buffalo, N. Y.—Bids will be received until May 20 by Lieut. Col. H. M. Adams, Corps Engrs., U. S. A., for breakwater extension at Cape Vincent, N. Y., as advertised in The Engineering Record.

Cleveland, O.—Bids will be received until May 19 by Lieut. Col. Dan. C. Kingman, Corps. Engrs., U. S. A., for reconstructing and repairing parts of the West Pier at Lorain Harbor, O.

Erie, Pa.—Bids will be received by Lieut. Col. H. M. Adams, Corps Engrs., U. S. A., Buffalo, N. Y., May 15, for channel and basin excavation at Erie Harbor, Pa., as advertised in The Engineering Record.

Pittsburg, Pa.—See "Power Plants, Gas and and Electricity."

Newport, R. I.—Bids will be received until May 10 by Lieut. Col. J. H. Willard, Corps Engrs., U. S. A., for dredging in New Bedford Harbor, Mass., as advertised in The Engineering Record.

Cookeville, Tenn.—Bids will be received until May 1 by the Com. (J. Arnold, Chmn.) for building a rock wall around the court house yard, to be about 200 ft. square, 3 ft. high, built of sandstone, 8-in. thick, the wall to be 20 in. wide at base and laid in Portland cement.

Houston, Tex.—See "Business Buildings."

Wheeling, W. Va.—Bids will be received by Maj. Geo. A. Zinn, Corps Engrs., U. S. A., Wheeling, on May 16 for furnishing and delivering about 15,000 bbls. of American Portland cement for Dam No. 18, Ohio River, as advertised in The Engineering Record.

Milwaukee, Wis.—Bids will be received by Maj. J. G. Warren, Corps Engrs., U. S. A.,

**Items marked thus give the names of parties awarded contracts.*

Milwaukee, on May 16, for dredging Gladstone Harbor, Mich., concrete superstructure on breakwater and on North Harbor pier, Milwaukee, and pile piers, etc., at Waukegan, Ill., as advertised in The Engineering Record.

Ashland, Wis.—Bids will be received by Maj. Chas. L. Potter, Corps Engrs., U. S. A., Duluth, Minn., on May 13, for furnishing and placing about 53,000 tons of riprap at Ashland, as advertised in The Engineering Record.

Stevens Point, Wis.—Bids are wanted May 3 for $145,000 county drainage bonds. Address D. H. Pratt, Plainfield, Wis.

Guantanamo, Cuba.—The Navy Dept. at Washington, D. C., is reported to have completed plans for a dry dock for the naval station and dock yard at Guantanamo.

Arden, Man.—It is stated that bids will be received until Apr. 25 for constructing the Jumping Deer Drain in Landsdowne; estimated quantities, 37,000 cu. yds. R. C. McPhillips, Engr. Winnipeg. M. E. Boughton, Town Secy.

Panama.—The following are the bids opened on Apr. 13 by the Isthmian Canal Comn., Washington, D. C., for furnishing 10,000 bbls. American Portland cement (*a*) price given per bbl.: Commercial Wood & Cement Co., New York, N. Y., $2.44; Atlas Portland Cement Co., $2.32, and Alfred Hiller, New Orleans, La., $2.32.

Bids will be received by Maj. H. J. Gallagher, U. S. A., Purchasing Agent, Isthmian Canal Comn., Washington, D. C., on May 16 for pine or Douglas fir, creosoted piles, wharf timber, etc., as advertised in The Engineering Record.

Bids will be received by the Isthmian Canal Comn., Washington, D. C., on May 17, for furnishing equipment for bridge and section gang, to include all kinds of railroad tools and supplies, foundry supplies, etc.; on May 18 for brick and fire clay, doors, blinds and wire screens, and also on May 18 for explosives, blasting powder, caps, etc., all 3 advertised in The Engineering Record.

Bids will be received by the Isthmian Canal Comn., Washington, D. C., May 11 for furnishing paints, oil, chemicals, tools, garbage carts, etc., as advertised in The Engineering Record.

Bids will be received until May 19 by the Isthmian Canal Comn. (Maj. H. J. Gallagher, Purchasing Agt.), Washington, D. C., for furnishing about 14,000,000 ft. of dressed lumber—yellow pine or Douglas fir—as advertised in The Engineering Record.

PROPOSALS OPEN

For Proposals see pages 57, 61, 62, 63, 64, 65

WATER WORKS.

Bids Close.		See Eng. Record.
Apr. 25.	Canal, pipe, etc., N. Orleans, La., Adv. Feb. 18 to Apr. 22	Feb. 18
Apr. 25.	Well, Lower Brule, S. D.	Apr. 8
Apr. 25.	Pipe, etc., St. Louis, Mo.	Apr. 15
Apr. 25.	Engine, Chicago, Ill.	Apr. 22
Apr. 25.	Pump. Sta. impr., Chicago, Ill.	Apr. 22
Apr. 25.	Pump. Sta., Buffalo, N. Y.	Apr. 22
Apr. 26.	Engine, Chicago, Ill.	Apr. 15
Apr. 26.	Pipe, hydrants, etc., Hadley, Mass.	Apr. 15
Apr. 26.	Tunnel, Chicago, Ill.	Apr. 22
Apr. 27.	Humansville, Mo.	Apr. 22
Apr. 28.	System, Cassville, Mo.	Apr. 15
Apr. 29.	Pipe, etc., Waterville, Me. Adv. Apr. 15.	Apr. 15
May 1.	Shirley, Ind.	Feb. 11
May 1.	Laying pipe, etc., Brandon, Man., Adv. Apr. 15, 22	Apr. 15
May 1.	Reservoir, Ft. Wright, Wash.	Apr. 15
May 1.	Water tower, Salem, Va.	Apr. 15
May 1.	Canal, etc., Cody, Wyo. Adv. Apr. 15, 22.	Apr. 15
May 1.	Engine house, etc., Ford City, Pa. Adv. Apr. 15	Anr. 15
May 1.	Scotia, N. Y.	Apr. 15
May 1.	Extension, Vallejo, Cal.	Apr. 22
May 1.	Pipe, Wilmington, Del. Adv. Apr. 22.	Apr. 22
May 1.	Standpipe improv., Falmouth, Mass.	Apr. 22
May 1.	Bagley, Minn.	Apr. 22
May 1.	Thief River Falls, Minn.	Apr. 22
May 1.	Pipe, Sioux City, Ia.	Apr. 22
May 2.	Pump'g plant, Downey, Cal.,	Apr. 8
May 2.	Well, etc., Panguitch, Utah,	Apr. 8
May 2.	Flow line, St. Louis, Mo.	Apr. 15
May 2.	Pipe laying, Cincinnati, O.	Apr. 8
May 2.	Washington, D. C.	Apr. 22
May 2.	Boilers, etc., Norwalk, O.	Apr. 22
May 3.	Lexington, N. C. Adv. Apr. 15, 22.	Apr. 15
May 3.	Humboldt, Kan. Adv. Apr. 22	Apr. 22
May 3.	Hydrants, etc., N. Y., N. Y.	Apr. 22
May 4.	Imp. plant, De Pere, Wis.	Apr. 15
May 5.	Pipe, etc., West Point, N. Y. Adv. Apr. 8 to 22.	Apr. 8
May 6.	Tank, Ft. Reno, Okla. Ter.	Apr. 15
May 10.	Chamberlain, S. D.	Apr. 22
May 11.	Pipe, New Orleans, La.	Mar. 25
May 11.	Pipe, West Point, N. Y. Adv. Apr. 15, 22	Apr. 15
May 11.	System, Ft. Ontario, N. Y. Adv. Apr. 15, 22.	Apr. 15
May 12.	Pipe, etc., Cincinnati, O.	Apr. 22
May 14.	System, Mansfield, La. Adv. Mar. 4, 11.	Mar. 4
May 15.	Engine, etc., Montreal, Que. Adv. Mar. 11.	Mar. 11
May 16.	Irrig. work, North Platte, Neb. Adv. Mar. 25 to Apr. 22,	Mar. 25
Jun. 1.	Canal, etc., Glendive, Mont., Adv. Apr. 8 to 22.	Apr. 8
Jun. —.	Prescott, Wash.	Apr. 1
Jun. —.	Alma, Wash.	Apr. 22
Jun. —.	Pumps, etc., Richland, Ga.	Apr. 22
Jun. —.	Pipe, etc., Thibodaux, La.	Apr. 22

SEWERAGE AND SEWAGE DISPOSAL.

Apr. 25.	Berlin, Ont.	Apr. 22
Apr. 26.	Ft. Caswell, N. C.	Apr. 15
Apr. 26.	Brooklyn, N. Y.	Apr. 15
Apr. 26.	New York, N. Y.	Apr. 22
Apr. 27.	St. Paul, Minn.	Apr. 22
Apr. 29.	Martins Ferry, O.	Apr. 22
May 1.	Lexington, Ky.	Apr. 1
May 1.	Toronto, O.	Apr. 15
May 1.	Thief River Falls, Minn.	Apr. 22
May 1.	Westfield, N. J.	Apr. 22
May 1.	Galt, Ont.	Apr. 22
May 1.	Pittsburg, Pa.	Apr. 22
May 2.	Panguitch, Utah	Apr. 8
May 2.	Waterbury, Conn.	Apr. 15
May 2.	St. Louis, Mo.	Apr. 22
May 3.	Cincinnati, O.	Apr. 15
May 3.	Brooklyn, N. Y.	Apr. 22
May 4.	Saltsburg, Pa.	Apr. 15
May 4.	Jacksonville, Fla.	Apr. 15
May 4.	Mt. Carmel, Pa. Adv. Apr. 22.	Apr. 22
May 6.	Ft. Wayne, Ind.	Apr. 15
May 8.	Berea, O.	Apr. 22
May 9.	Wellsville, N. Y. Adv. Apr. 22.	Apr. 22
May 10.	Chamberlain, S. D.	Apr. 22
May 12.	Idaho Falls, Idaho	Apr. 22
May 14.	Birmingham, Ala.	Apr. 22
May 17.	Washington, D. C.	Apr. 22
May —	New Britain, Conn.	Apr. 8

BRIDGES.

Apr. 26.	Denver, Colo. Adv. Apr. 1 to 22	Apr. 1
Apr. 27.	Jersey City, N. J.	Apr. 22
Apr. 28.	Neleigh, Neb.	Apr. 22
Apr. 29.	Cleveland, O.	Apr. 8
May 1.	Richland, Ark.	Mar. 11
May 1.	Washington, D. C. Adv. Apr. 8, 15.	Apr. 8
May 1.	Medina, O.	Apr. 15
May 1.	Greenwood, Ark.	Apr. 15
May 1.	Tipton, Ind.	Apr. 22
May 1.	Bamberg, Ont.	Apr. 22
May 2.	Carrollton, Mo.	Apr. 15
May 2.	Norwalk, O.	Anr. 22
May 2.	Plymouth, Ind.	Apr. 22
May 3.	Peru, Ind.	Apr. 8
May 3.	Wabash, Ind.	Apr. 8
May 3.	Bluffton, Ind.	Apr. 15
May 4.	Wabash, Ind.	Apr. 15
May 4.	Columbus, O.	Apr. 15
May 4.	Birmingham, Ala.	Apr. 15
May 4.	Bryan, O.	Apr. 22
May 4.	Jersey City, N. J.	Apr. 22
May 5.	Lockland, O.	Apr. 8
May 8.	Olivet, S. D.	Apr. 22
May 10.	Pembina, N. D.	Apr. 22
May 10.	Cleveland, O.	Apr. 22
May 11.	New York, N. Y.	Apr. 22
May 17.	Cleveland, O.	Apr. 22

PAVING AND ROADMAKING.

Apr. 25.	St. Louis, Mo.	Apr. 15
Apr. 25.	Wilmette, Ill.	Apr. 22
Apr. 25.	New Brighton, S. I., N. Y.,	Apr. 22
Apr. 25.	South Bend, Ind.	Apr. 22
Apr. 25.	Toledo, O.	Apr. 22
Apr. 25.	Parry Sound, Ont.	Apr. 22
Apr. 26.	Cincinnati, O.	Apr. 8
Apr. 26.	Hoboken, N. J.	Apr. 8
Apr. 26.	Brooklyn, N. Y.	Apr. 15
Apr. 26.	Paducah, Ky.	Apr. 22
Apr. 26.	Chicago, Ill.	Apr. 22
Apr. 27.	Augusta, Ga., Adv. Apr. 15, 22	Apr. 15
Apr. 27.	West Point, N. Y.	Apr. 22
Apr. 28.	Youngstown, O.	Apr. 15
Apr. 29.	Wilkesbarre, Pa. Adv. Apr. 15.	Apr. 15
Apr. 29.	E. St. Louis, Ill.	Apr. 22
Apr. 29.	Seattle, Wash.	Apr. 22
Apr. 30.	**Vicksburg, Miss.**	**Mar. 25**
May 1.	**Parkridge, Ill.**	**Mar. 11**
May 1.	Evansville, Ind.	Apr. 1
May 1.	Ft. Porter, N. Y.	Apr. 15
May 1.	Bucyrus, O.	Apr. 15
May 1.	Bedford, Ind.	Apr. 15
May 1.	Vernon, Ind.	Apr. 15
May 1.	New Brunswick, N. J.	Apr. 15
May 1.	Long Island City, L. I., N. Y.	Apr. 22
May 1.	Pittsburg, Pa.	Apr. 22
May 2.	Trenton, N. J., Adv. Apr. 15, 22	Apr. 15
May 2.	**Bloomfield, Ind.**	**Apr. 15**
May 2.	Versailles, Ind.	Apr. 15
May 2.	St. Paul, Minn.	Apr. 22
May 3.	Brooklyn, N. Y.	Apr. 22
May 4.	Cincinnati, O.	Apr. 15
May 4.	St. Charles, Mo. Adv. Apr. 15, 22.	Apr. 1
May 4.	Akron, O.	Apr. 22
May 5.	Holyoke, Mass (3 prop.) Adv. Apr. 22.	Apr. 22
May 6.	Washington, Pa.	Apr. 15
May 6.	Cleveland, O.	Apr. 22
May 8.	Delaware, O.	Apr. 22
May 8.	National Home, Wis.	Apr. 22
May 9.	Delaware, O.	Apr. 22
May 9.	Atlantic City, N. J.	Apr. 15
May 9.	Peru, Ind.	Apr. 22
May 9.	Wellsville, N. Y. Adv. Apr. 22.	Apr. 22
May 10.	Ft. Greble, R. I. Adv. Apr. 15, 22.	Apr 15
May 10.	Cincinnati, O.	Apr. 22
May 10.	Delaware, O.	Apr. 22
May 11.	New York, N. Y.	Apr. 22
May 13.	Cleveland, O.	Apr. 22
May 13.	Norwood, O.	Apr. 22
Jun 1.	Owensboro, Ky.	Apr. 22
———	Belair, Md.	Apr. 8

POWER, GAS AND ELECTRICITY.

Apr. 25.	Washington, D. C.	Apr. 1
Apr. 25.	Chicago, Ill.	Apr. 22
Apr. 26.	Des Moines, Ia.	Apr. 15
Apr. 27.	**Ligonier, Ind.** Adv. Mar. 25 to Apr. 8.	**Mar. 25**
Apr. 27.	Leadville, Colo.	Apr. 22
Apr. —.	Ft. Valley, Ga.	Jan. 21
May 1.	Empire, Colo.	Mar. 18
May 1.	Shirley, Ind.	Feb. 11
May 1.	Meridian, Miss.	Apr. 15
May 1.	Keene, N. H. Adv. Apr. 8, 15.	Apr. 8
May 1.	Long Island City, L. I., N. Y.	Apr. 22
May 1.	Pittsburg, Pa.	Apr. 22
May 2.	**Modesto, Cal.**	**Mar. 25**
May 2.	Ft. Ontario, N. Y. Adv. Apr. 8 to 22,	Apr. 8
May 2.	Lafayette, Ind.	Apr. 22
May 2.	Washington, D. C.	Apr. 22
May 3.	Washington, D. C.	Apr. 8
May 3.	Ft. Brady, Mich., Adv. April 15, 22	Apr. 15
May 8.	Binghamton, N. Y.	Apr. 22
May 10.	Lyons, Kan.	Apr. 8
May 12.	Pittsburg, Pa.	Apr. 22
May 15.	**Jewell City, Kan.**	**Mar. 18**
May —.	**Meridian, Miss.**	**Mar. 25**
Jun. 3.	Cape Charles, Va.	Apr. 8
Jun. 6.	Sebastapol, Cal.	Apr. 22

BUILDINGS.

Apr. 25.	Htg. P. O. Bldg., Pierre, S.D.	Apr. 1
Apr. 25.	Post Bldgs., Ft McPherson, Ga., Adv. Apr. 1 to 22	Apr. 1
Apr. 25.	School, Aberdeen, S. D.	Apr. 8
Apr. 25.	Univ. Ann Arbor, Mich.	Apr. 15
Apr. 25.	Office Bldg., Baltimore, Md.	Apr. 15
Apr. 25.	Schools, Van Wert, O.	Apr. 15
Apr. 25.	Academy improv., Pocatello, Idaho	Apr. 15
Apr. 25.	Pub. Bldg., Lead, S. D.	Apr. 15
Apr. 25.	School, Indianapolis, Ind.	Apr. 15
Apr. 25.	Court house, Crossville, Tenn.	Apr. 22
Apr. 26.	School, McMechen, W. Va.	Apr. 1
Apr. 26.	Library, Bangor, Me.	Apr. 15
Apr. 26.	Hospital improv., Rochester, N. Y. Adv. Apr. 15, 22.	Apr. 15
Apr. 26.	School, Baltimore, Md.	Apr. 22
Apr. 26.	Engine house, Baltimore, Md.	Apr. 22
Apr. 26.	Hospital, New York, N. Y.	Apr. 22
Apr. 26.	Jail, Baltimore, Md.	Apr. 22
Apr. 26.	School, Chattanooga, Tenn.	Apr. 22
Apr. 26.	Hospital, Lancaster, Wis.,	Apr. 22
Apr. 27.	P. O. Bldg., Flint, Mich.	Apr. 8
Apr. 27.	Pub. Bldgs., Lima, O.	Apr. 8
Apr. 27.	Court House, Magnolia, Ark.	Apr. 15
Apr. 27.	School, Pittsburg, Pa.	Apr. 22
Apr. 27.	School, New Richmond, Wis.,	Apr. 22
Apr. 27.	Church, Lexington, Ky.	Apr. 22
Apr. 28.	Post Bldgs., Ft. Moultrie, Ga., Adv. Apr. 1 to 22	Apr. 1
Apr. 28.	Court House, Wynne, Ark.	Apr. 1
Apr. 28.	School, Cresco, Ia.	Apr. 15
Apr. 28.	Pub. Bldg., improv., New York, N. Y.	Apr. 22
Apr. 28.	Court House, Tuskegee, Ala.	Apr. 22
Apr. 29.	Htg. Pub. Bldg., Washington Barracks, D. C. Adv. Apr. 1 to 22,	Apr. 1
Apr. 29.	Pub. Bldgs., Boston, Mass.	Apr. 8
Apr. 29.	Church, Steubenville, O.	Apr. 15
Apr. 29.	School, Webster, S. D.	Apr. 15
Apr. 29.	School, West Liberty, Pa.	Apr. 22
Apr. 29.	Pub. Bldg., Lexington, Ky.	Apr. 22
Apr. 30.	Bank, Buffalo, N. Y.	Apr. 1
Apr. —.	Hospital, Oakland, Cal.	Apr. 15
Apr. —.	School, New Haven, Conn.	Mar. 4
Apr. —.	Asylum, Jamestown, N. D.	Mar. 25
May 1.	College plans, Washington, D. C.	Mar. 25
May 1.	**Remov. Pub. Bldgs., Sulphur, Ind. Ter.**	**Apr. 1**
May 1.	P. O. Bldg., Jacksonville, Ill., Adv. Apr. 1, 8.	Apr. 1
May 1.	School, Sharpsville, Ind.	Apr. 8
May 1.	Pub. bldg. plans, Jefferson City, Mo., Adv. Apr. 8.	Apr. 8
May 1.	Schools, New York, N. Y.,	Apr. 15
May 1.	School, Regina, N. W. Ter.	Apr. 22
May 1.	Jail improv., Aberdeen, Miss.,	Apr. 22
May 1.	Library, Rochester, Ind.	Apr. 22
May 1.	Bus. Bldg., Knoxville, Tenn.	Apr. 22
May 1.	Plumb. Pub. Bldg., New York, N. Y.	Apr. 22
May 1.	Schools, Brooklyn, N. Y.	Apr. 22
May 1.	Asylum, Steilacoom, Wash.,	Apr. 22
May 1.	Pub. Bldgs., Phila., Pa.,	Apr. 22
May 1.	School, Norway, Mich.	Apr. 22
May 1.	School, Shreveport, La.	Apr. 22
May 2.	School, Panguitch, Utah	Apr. 8
May 2.	Hospital, St. Louis, Mo.	Apr. 8
May 2.	Court House, Detroit, Mich.	Apr. 15
May 2.	School, Madison, Wis.	Apr. 15
May 2.	Bus. Bldg., New Bedford, Mass.	Apr. 22
May 2.	Pub. Bldg., Janestown, N. D.	Apr. 22
May 2.	Library, Rockhill, S. C.	Apr. 22
May 3.	Court House, Vinton, Ia.	Apr. 1
May 3.	Court House, Hillsboro, N. D.	Apr. 22
May 3.	Pub. Bldg., Wash., D. C.	Apr. 22
May 4.	Boat House, Ft. Morgan, Ala. Adv. Apr. 15, 22.	Apr. 15
May 4.	School, Steubenville, O.	Apr. 22
May 4.	School, Fairfield, Ia.	Apr. 22
May 5.	School, Cleveland Hgts., O.	Apr. 22
May 6.	P. O. Bldg., Florence, S. C.	Apr. 8
May 6.	Infirmary, Valparaiso, Ind.,	Apr. 22
May 8.	**Interior finish, U. S. Custom House, New York, N. Y., Adv. Mar. 11, 18**	**Mar. 18**
May 8.	School, Albuquerque, N. M.,	Apr. 22
May 9.	**Mech. Equip. U. S. Custom House, New York, N. Y., Adv. Mar. 11, 18**	**Mar. 18**
May 9.	School, Phoenix, Ariz.	Apr. 22
May 9.	Pub. Bldgs., Concord, N. H.	Apr. 22
May 9.	Infirmary, etc., Steubenville, O.	Apr. 22
May 10.	Pub. Bldg., Norwalk, O.	Apr. 22
May 10.	School, Chamberlain, S. D.,	Apr. 22
May 10.	Court House, Grundy, Va.,	Apr. 22
May 11.	P. O. Bldg., Laramie, Wyo.	Apr. 8
May 11.	Hospital Improv., Ft. Assiniboine, Mont.	Apr. 15
May 11.	School, Zuni, N. M.	Apr. 22
May 11.	School, Salem, N. J.	Apr. 22
May 11.	School plans, Sacramento, Cal.	Apr. 22
May 11.	Hospital, Cincinnati, O.	Apr. 22
May 12.	Post Bldgs., Prescott, Ariz. Adv. Apr. 15, 22	Apr. 15
May 12.	Arsenal, Philadelphia, Pa.	Apr. 22
May 13.	School, Des Moines, Ia.	Apr. 22
May 13.	Terra-cotta for War College, Washington Barracks, D. C., Adv. Apr. 15, 22.	Apr. 15
May 15.	School, Port Arthur, Tex.	Apr. 1
May 15.	Post Bldgs., Ft. Sam Houston, Tex., Adv. Apr. 15, 22	Apr. 15
May 15.	Univ., Wilberforce, O.	Apr. 22
May 16.	Pub. Bldg., Elkhart, Ind.	Apr. 15
May 17.	Pub. Bldg., Wash., D. C.	
May 17.	Hospital, Dayton, O.	
May 18.	Pub. Bldg., National Home, Wis.	
May 22.	P. O. Bldg., Oil City, Pa. Adv. Apr. 15, 22.	
May 23.	P. O. Bldg., Owosso, Mich.	
May 25.	P. O. Bldg., Geneva, N. Y. Adv. Apr. 22.	
Jun. 5.	Capitol, Frankfort, Ky.	
Jun. 12.	Capitol plans, Boise, Idaho	
Jun. 15.	**Court House plans, New Orleans, La.**	
Jun. 15.	Synagogue plans, Houston, Tex.	
Jun. 15.	Court House plans, New Orleans, La.	
Jun. 20.	School, Dillon, Mont.	
———	School plans, Needham, Mass.	
———.	Jail, etc., Beaufort, N. C.	

MISCELLANEOUS.

Apr. 25.	Dredging, New Orleans, La.	
Apr. 25.	Ditch, Windom, Minn.	
Apr. 25.	Pipe covering, Dayton, O.	
Apr. 25.	Watering trucks, Brooklyn, N. Y.	
Apr. 25.	Retain. wall, Hartford, Conn.,	
Apr. 25.	Drain, Arden, Man.	
Apr. 27.	Trap Rock, Holyoke, Mass.	
Apr. 27.	Dredging, Wilmington, Del.,	
Apr. 28.	Garb. Disp., Washington, D. C.	
Apr. 28.	St. cleaning, Akron, O.	
Apr. 28.	Sprinkling, Dayton, O.	
Apr. 29.	Coal handling plant, New Orleans, La.	
Apr. 29.	Dock, Burlington, Vt.	
Apr. 29.	Ditch, Mt. Vernon, Ind.	
May 1.	R. R. work, Toronto, Ont.	
May 1.	Machinery, Panama, Adv. Adv. Apr. 8 to 22.	
May 1.	Cement, etc., Portland, Me. Adv. Apr. 15 to 22.	
May 1.	Ditch, Hutchinson, Kan.	
May 1.	Wall, Cookeville, Tenn.	
May 1.	Ferry terminal, St. George, S. I., N. Y.	
May 2.	Tools, etc., Panama Adv. Apr. 1 to 22.	
May 2.	Drainage work, Breckenridge, Minn.	
May 2.	Supplies, Washington, D. C.,	
May 2.	Pier, Edgewater, N. J. Adv. Apr. 22.	
May 3.	Steam shovels, Panama Adv. Apr. 1 to 22.	
May 3.	Dredging, Newport, R. I. Adv. Apr. 1 to 22.	
May 3.	Dam, Parkersburg, W. Va., Adv. Apr. 8 to 22.	
May 3.	Jetty construction, Nantucket, Mass. Adv. Apr. 8 to 22.	
May 4.	Garb. Disp., Philadelphia, Pa.	
May 4.	Screenings, etc., Brooklyn, N. Y.	
May 5.	R. R. supplies, Panama	
May 6.	**Quay Wall, Bremerton, Wash.**	**Ma**
May 6.	Breakwater work, Cleveland, O.	
May 6.	Cableways, Guantanamo, Cuba	
May 8.	Dredging, Newport, R. I. Adv. Apr. 15 to 22.	
May 9.	Supplies, Washington, D. C.,	
May 9.	Iron, etc., New York, N. Y.	
May 10.	**Ditch, Stevens Point, Wis.**	**Fel**
May 10.	Elevator, New York, N. Y.	
May 10.	Earth spreaders, etc., Panama. Adv. Apr. 15 to 22.	
May 10.	Supplies, Washington, D. C.,	Apr.
May 10.	Cable, Charlevoix, Mich.	Apr.
May 10.	Dredging, Newport, R. I. Adv. Apr. 22.	Apr.
May 11.	Paints, garbage carts, etc., Panama Adv. Apr. 22.	Apr.
May 11.	Stone, Port Harford, Cal.	Apr.
May 11.	Drain, Auburn, Ind. Adv. Apr. 22.	Apr.
May 12.	Removing rock, New York, N. Y., Adv. Apr. 15 to 22	Apr.
May 12.	Supplies, Panama (2 prop.), Adv. Apr. 15 to 22.	Apr.
May 12.	Drain, Pittsburg, Pa.	Apr.
May 13.	Supplies, Panama (2 prop.), Adv. Apr. 15.	Apr.
May 13.	Pier improv., Buffalo, N. Y. Adv. Apr. 15 to 22.	Apr.
May 13.	Rip rap, Ashland, Wis., Adv. Apr. 22	Apr.
May 15.	Dredging, Providence, R. I., Adv. Apr. 15, 22	Apr.
May 15.	Sanitary fixtures, etc., Panama (2 prop.) Adv. Apr. 15 to 22.	Apr.
May 15.	Excav., Chicago, Ill. Adv. Apr. 22	Apr.
May 15.	Channel excav., Erie, Pa. Adv. Apr. 22	Apr.
May 16.	Supplies, Washington, D. C.	Apr.
May 16.	Dredging, etc., Milwaukee, Wis. Adv. Apr. 22	Apr.
May 16.	Cement, Wheeling, W. Va. Adv. Apr. 22	Apr.
May 16.	Pine, etc. Panama. Adv. Apr. 15, 22	Apr.
May 17.	Fire escapes, Wash., D. C.,	Apr.
May 17.	R. R. tools, etc., Panama, Apr. 22	Apr.
May 18.	Brick, screens, etc. Panama. Adv. Apr. 22	Apr.
May 18.	Explosives. Panama. Adv. Apr. 22	Apr.
May 19.	Jetty work, Savannah, Ga. Adv. Apr. 22	Apr.
May 19.	Pine, Panama. Adv. Apr. 22,	Apr.
May 19.	Pier, Cleveland, O.	Apr.
May 20.	Breakwater, Buffalo, N. Y. Adv. Apr. 22	Apr.
Jun. —.	Dam, Iowa City, Ia.	Apr.
Jul. 1.	Municipal St. Ry. system, Chicago, Ill. Adv. Apr. 15-22.	Apr.
Sept. 1.	Steel and iron, Sydney, N. S. Wales. Adv. Apr. 8	Apr.
———	**R. R. Work, Corry, Pa.**	**Apr.**
———	R. R. work, Oglethorpe, Ga.	Apr.

**Items marked thus give the names of parties awarded contracts.*